AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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No. 19

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THE most valuable thing in business is good will.

And good will is just a reputation for quality.

It attracts steady customers—therein lies its great value.

Nothing sold by garagemen, auto supply dealers and hardware dealers is so representative of distinctively superior quality as Champion Dependable Spark Plugs.

So the finger points to the mark of spark-plug quality—that one word "Champion" on the porcelain of the plug.

Sell Champions—their quality attracts steady customers—establishes that most valuable asset in business—good will.

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Toledo, Ohio

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Johnson's Carbon Remover is perfectly harmless. It contains no acids and does not affect lubrication or interfere with the oil in the crank case. Has no action on any metal. Over three million cans used with entire satisfaction.

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We publish an attractive little booklet entitled "Keep Your Car Young." This is full of valuable information to every man who owns or drives an automobile. We shall be glad to send it to you free and postpaid.

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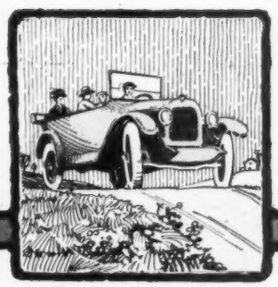
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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XXXVIII NEW YORK—THURSDAY, MAY 9, 1918—CHICAGO NO. 19

Aircraft Investigation Needed to Clarify Situation

Howard E. Coffin Asks President to Institute Probe—Sane Publicity the Great Need—Misleading Reports and Rumors Must Be Stamped Out — Let the Truth Be Told

Coffin's Request

The President: Charges of dishonesty have been made against the aircraft board which demand the fullest inquiries. I request and urge that an official inquiry be had in order that the reputations of innocent men may not be ruined.—Howard E. Coffin.

The President's Reply

Your telegram received and you may be sure that I shall co-operate in every way to prevent what you rightly foresee might happen. The Department of Justice will co-operate to the utmost in seeing that all charges are probed and the truth got at.—Woodrow Wilson.

WASHINGTON, D. C., May 8—Howard E. Coffin's request to President Wilson for a thorough investigation of the activities of the Aircraft Production Board since its organization is one of the sanest suggestions that has come out of the Washington babble in the last week.

Mr. Coffin, former chairman of the board, asks for this investigation in order to clear those connected with the board of the various accusations made against them. The President has agreed to such an investigation and the completest information will be welcomed.

There has been a too heavy veil of secrecy surrounding the activities of the Board, and as a result misleading and baseless rumors have received as much credence as reliable and trustworthy reports.

This investigation should result in making public volumes of information which will create some optimism among the American people without danger of giving secrets to our enemies. There are literally thousands of facts connected with our airplane activities which should have been made public in the last 6 months. These facts would have had a very desirable effect on the public and would not have given any comfort to the enemy.

Congressmen and senators have been the victims of various kinds of misleading and alleged official reports and there has been no difficulty in reading these into the Congressional Record, thereby giving them the stamp of approval. Such reports have been taken up by the press and heralded too widely throughout the country.

Many other misleading reports of a critical nature have been given very general circulation. A case in question was that recently a hydroplane with a Liberty engine was flying over an aviation field near the capitol, when a single-seated French fighting plane drew near and not only flew around the Amer-

ican machine but gave a demonstration of fighting stunts that the hydroplane was never expected to perform.

There was only one inference from the report, namely, that our planes were vastly inferior and not up to fighting requirements. This story went broadcast. It discounted our own machines.

The error lay in the fact that it was utterly ridiculous to compare the two machines. They were intended for entirely different work and each was built for its specific job. The French machine was a stunt battleplane. The American hydroplane was for observation and other purposes.

When the pilot of the French machine read the comments in a Washington paper he was thunderstruck at the ignorance of the paper and amazed to think that such unreasonable and ridiculous comparisons should be imposed on the American public. Such a comparison would never have been thought of in France. The case would suggest a parallel of a fleet motorboat and a sea-going tug in which the motorboat would sail around the tug and perform a dozen other stunts which the tug was never designed to perform.

Borglum Report Discredited

The general discrediting of the alleged official report by Gutzon Borglum, the New York sculptor, in official Washington, is one clarifying feature of the week. Until the correspondence between President Wilson and Mr. Borglum was made public there was a very general feeling that the President had commissioned Mr. Borglum to furnish an official report.

This has been specifically denied. Mr. Borglum imposed himself upon the President, and, as the President might have done with any other friend, he suggested that officials would be glad of any information that would shed light on the highly embroiled aircraft situation.

As the Borglum report has not been made public, it is not definitely known what it embraces, but sufficient has been made known generally to discredit the report, and it is fortunate that a Senate investigation requested by Mr. Coffin will take the place of any reports such as the Borglum one.

Unfortunately, too much circulation has been given to the report of the Aeronautical Society of New York. This report has been peddled around for publicity purposes, and can only be construed as a sorehead production. It deals too much in generalities to be of any value.

Marshall Report Is Valuable

As days pass, and the situation clarifies, it is constantly more apparent that the Marshall report asked for by the President, and properly handed over to the President, as it should be, is a valuable document, and as soon as the Overman bill authorizes the President to reconstruct the Aircraft Production Board, giving the new head, John F. Ryan, authority which he has not to-day, and which Mr. Coffin never had, it is expected that definite progress will be made.

The publicity from the Aircraft Production Board has been poorly handled since last July. It has been known that there have been divisions of opinion on this. Mr. Coffin has favored publicity, but his advice in this has been overruled. Unfortunately, much publicity that has been given out has not been of the right kind. Facts have been withheld that if made public would have had a wonderful stabilizing influence.

There have been flights made with Liberty engines in the past months which should have been carried in every paper in the country. Not a word has been published regarding them, although the enemy has had every opportunity of getting all the information. There have been photographs in connection with these flights that would have set at naught the malicious reports that the engine has not been able at times to get off the ground.

There has not been any official effort to deny other reports, such as that tending to show that the number of accidents on our training fields has been too great, the implication being that our design and manufacture were at fault. Specific figures would prove otherwise, but such desirable publicity has not been circulated as it should.

Much of a stabilizing nature could be said of our aviation training fields and training schools which would not have given information of value to the enemy. We have been permitted to publish photographs of Europe's training fields, but not permitted to publish those of our own training fields. Photographs showing rows of hangars in some of our training fields would have carried evidence as to where some of the $640,000,000 appropriation has gone, but such photographs have been prohibited.

Many Photographs Available

AUTOMOTIVE INDUSTRIES made efforts last summer and autumn to have such photographs given general circulation. This was agreed to by leading men on the Aircraft Production Board, but was later shut off by some authorities higher up. There was no sense or reason in cutting off such publicity, which would at least have given millions of our people sufficient facts so that they could pass sane judgment on the too numerous rumors that are going around.

It is most unfortunate that the rumor of the Liberty engine being nothing but a Packard engine should have been given such circulation. This looks like driving a wedge into the industry. Such a rumor would never have gained circulation had stories of the Liberty engine, which were written as long ago as June, 1917, been permitted to be published. Officials of the Aircraft Production Board wanted such information given out, but it was stopped in other ways.

The public should know that the fundamentals of the Liberty engine are based on European designs, and that the present engine is not the experimental engine developed by the Packard company, and for which it was reported that the Packard company is now asking the government for a sum between $500,000 and $1,000,000 to pay for the development of its aviation engine—an engine it bodily set aside when the development of the Liberty engine was started.

The design of steel cylinders of the Liberty engine, which are made from forgings, and have stamped water jackets welded in place, were taken from the Mercedes racing cars which won the Grand Prize race in France in June, 1914, scarcely a month before war was declared. We know that Mercedes was manufacturing aviation engines of this type in great quantities before war was declared, and that when war was declared there were over 3000 of these engines ready for use. There are engineers in America to-day who visited the Mercedes factory in Germany and saw these engines.

In the Liberty engine practically no effort is made to interfere with this design of cylinder. The valve position was not changed. There may have been some detail changes, but fundamentally the cylinder design originated in Europe and not in America.

The present Liberty engine has the two groups of six cylinders set at a different angle than the original Packard aviation engine. Many other examples might be

cited to show that the present Liberty engine is not a Packard engine, although there may be many details in it that were Packard, the same as there are many details developed by other companies. The connecting-rod design was developed by DeDion. It is approximately the same as used in Cadillac cars, which copied the DeDion practice. So it is with other details entering into the design. In view of this it is unfortunate that the impressions should have gone abroad that it is a Packard engine.

Credit Where Credit Is Due

Packard must be given due credit for the development work it did during 2½ or 3 years previous to the war, and nobody will have any thought of not giving credit where credit is due. Undoubtedly the company spent over $500,000 on this development work previous to our entering into the war, and unquestionably much of this experience enabled Lieut.-Col. J. G. Vincent to make the progress that was made in the design of the Liberty engine. This, however, is quite different from calling the present Liberty engine a Packard engine.

At present it would seem that all accusations as to profiteering, etc., on the part of airplane manufacturers on the $640,000,000 appropriation are most groundless, and perhaps the most ridiculous rumors of the day. Such rumors are based on the condition that so few planes have been manufactured. The report has been circulated that each of the planes that we had on the fighting front in Europe cost us approximately $140,000,000. This is about as ridiculous, although it may be true, as to say that the first automobile of a given model may cost $150,000, which sum includes development costs and jigs and tools.

How Some of the Money Was Spent

Some recent reports have been given out as to some of the ways in which the $640,000,000 has been expended. Some of these items are as follows:

A—For airplanes, engines, and general machine equipment	$163,000,000
B—For hangars and aviation fields in U. S. A.	42,000,000
C—For aviation fields, etc., in France	31,000,000
D—For gas balloons	5,000,000
E—In the hands of disbursing agents	31,000,000

This gives a total of $272,000,000, but it is stated that the War Department has already expended $307,000,000 for airplanes and fields, not all of which appears in this tabulation.

There is a balance on hand of $433,000,000 not expended which gives a pretty general impression of how the Aircraft Production Board will be able to explain where the $640,000,000 has been expended without any profiteering.

Some conception of the size of the Signal Corps may be obtained from the following information. The personnel includes the following:

Military aviators	3,600
Graduates of aviation schools	6,100
Men examined and waiting	5,000
Flying and non-flying officers in this country	15,000
Total Signal Corps roster	133,000

It has been given out to-day that production for the week of April 27 was 136 combat and bombing planes, which is taken to mean the DeHaviland type fitted with Liberty engines. In addition there were 500 combat and bombing-plane engines. The first full boatload of Curtiss fighting airplanes was shipped to France last week.

Reports circulated in this country to the effect that contracts for 5000 Liberty engines have been canceled in favor of foreign contracts are untrue. No contracts for Liberty engines have been canceled.

Col. E. A. Deeds, who has been accused by Gutzon Borglum of being pro-German, and having changed his name from Dietz, and as having deliberately retarded aircraft production, welcomes the investigation, and states Borglum came to him last summer with a fish airplane plan based on a principle by which air was to be drawn into the fish from the forward end and blown out in the rear, the aviator staying inside and operating from there.

Deeds rejected the plan, which was also later rejected by the Aircraft Board. Deeds also had differences over money matters with Borglum a year ago regarding sculpture for Deeds' son's mausoleum, and with a memorial to Wilbur Wright which was to have been erected in Dayton. Deeds would like a military court martial investigation to clear his name.

Why Production Was Delayed

Airplane engine production is not where it was expected to be. Only one company, namely, Packard, is in quantity production on regular production basis. It has been turning out approximately 100 engines a week for some time, and should soon be gaining on this schedule.

It is known that its production has been hampered by difficulty in the manufacture of certain parts of the engine, delay having been caused, for example, by the problems involved in the manufacture of connecting rods. Other factories—for example, Marmon, Lincoln, Cadillac and Trego—have been making parts for weeks, and soon should be on a production basis. Marmon and Lincoln have built new factories and equipped these especially for this work. The Trego factory has been similarly fitted up. Without any serious unexpected delays it would seem that production should be tripled within the next couple of months.

There have been other factors that have held back the production of completed planes, these being delays on certain equipment, such as the machine-gun mounting referred to a week ago. The firms in the automobile industry cannot be blamed for the delay in production, as the question of machine-gun mounting was one that Washington decided upon. There were in one factory many practically completed planes which were held up for some months due to the factory not receiving from Washington the complete scheme of mounting all the equipment.

There have been delays in the development of the Liberty engine, as AUTOMOTIVE INDUSTRIES has previously told. It was unfortunate that the engine should have been approved at first without a pressure oiling system to the crankshaft bearings and the lower connecting rods. The first engines were produced without this. They burned out bearings in a matter of 8 to 10 hr. in endurance tests. Some engines were shipped abroad with the first oiling system. It is not surprising that some connecting rods have broken in French tests due to this. That was one of the troubles that perhaps should not have occurred. Many of our engineers knew better, but they were led to a compromise, on the ground that other engineers in the work had aviation engine experience and declared that the original design was satisfactory.

Perhaps this lubrication difficulty would not have been so serious had it not been that the engine first designed as a 330-hp. unit was stepped up to a 450-hp. rating.

It is not surprising that connecting rods designed for 330 hp. should fail under a 450-hp. load. It is not surprising that an oiling system that was sufficient in one should fail in the other. It is not surprising that a radiator large enough for 330 hp. would not cool the 450-hp., and that heating should result.

It is useless to endeavor to cover up the fact that a great many changes have been made in the engine. It is reported that all told over 1700 changes have been made.

This figure is misleading.

Hundreds of these have been very minor changes in blue prints, which never affected anything further than blue prints. This does not conceal the fact that there have been hundreds of engineering changes.

(*Continued on page* 930)

Correspondence That Preceded Investigation

Senator Thomas of Colorado asked the advise of President Wilson and received the following reply:

My dear Senator—You were kind enough to consult me the other day about the wholesale charges in regard to the production of aircraft which have been lodged by Gutzon Borglum. I take the liberty of writing you this letter in order to say more formally what I said to you informally, namely, that every instrumentality at the disposal of the Department of Justice will be used to investigate and pursue charges of dishonesty or malversation of any kind if the allegations made by Mr. Borglum are considered worthy of serious consideration, and I sincerely hope that the matter will be treated as one for searching official investigation by the constituted authorities of the Government. Only in this way can the reputation of those whose actions have been perfectly regular and blameless be protected and the guilt, if there is any, definitely lodged where it should be lodged. Sincerely yours, WOODROW WILSON.

The correspondence between Mr. Borglum and the President follows:

December 5, 1917.

My dear Mr. Borglum—Your letter of November 2 to Mr. Tumulty he was kind enough to show me, and I meant to write to you sooner about it. Of course, what you say disturbs me not a little, and I write to ask you if you will not do me the great favor of indicating as specifically as possible the weaknesses you see in our present organization in the matter of aeronautics. I would also appreciate it very warmly if you would tell me what men of practical gifts now connected with the service of the Government you think could be serviceable to us in working toward a successful result. Cordially and sincerely yours, WOODROW WILSON.

Next came the letter which Mr. Borglum interpreted as making him a personal investigator for the President:

January 2, 1918.

My dear Mr. Borglum—I have your letter of December 25. Knowing the earnest and loyal purpose with which you have written me, I have conferred with the Secretary of War and, at his request and my own hearty concurrence, I urge you to come at once to Washington, lay the whole matter frankly and fully before the Secretary, and by your own investigation discover the facts of this business.

The Secretary of War assures me that he will be delighted to clothe you with full authority to get at the bottom of every situation, and that he will place at your disposal the services of Mr. Stanley King, a member of his own personal staff, if you desire to have his counsel in your inquiries. The Secretary further says that he will bring you into personal contact with General Squier, who you doubtless already know personally, and will direct that every facility of inquiry be placed at your disposal.

When you have thus investigated, if the other experts whom you suggest in your letter of December 25 still seem desirable to be appointed, you can say so to the Secretary, and in the event of any difference of judgment between you, which seems to be impossible, I would be most happy to have a report from you personally to me on every phase of the matter which remains in the slightest degree doubtful in your mind. Cordially yours, WOODROW WILSON.

The third letter from the President was as follows:

March 15, 1918.

My dear Mr. Borglum—I have your letter of March 11 and thank you for it. I am writing in great haste to say that the whole aircraft matter is undergoing a very thorough review. In haste, sincerely yours, WOODROW WILSON.

This is the fourth letter:

March 29, 1918.

My dear Mr. Borglum—In view of your telegram of yesterday I am very glad to explain to you what my telegram to you meant. It meant this, that I have now instituted a very systematic inquiry into the whole aviation situation and think it wise that all processes of investigation should be in the charge and under the direction of the gentlemen to whom I have committed this task. I have placed at their disposal the material you were kind enough to furnish me with and can assure that they will go to the bottom of it all.

I know your judgment will approve of this. Sincerely yours, WOODROW WILSON.

A week later the President wrote as follows:

April 4, 1918.

My dear Mr. Borglum—Thank you very much for your letter of yesterday. You may be sure that the whole matter will be and is being gone into to the bottom. Cordially and sincerely yours, WOODROW WILSON

On April 15 the President sent the following letter:

My dear Mr. Borglum—I am afraid that for some time you have been under a serious misapprehension. You direct my attention to the fact that you were not supplied with suitable expert assistance in the investigation which you of your own motion undertook of the aircraft production.

You will remember that at the beginning you wrote to me saying that you feared and believed that there were serious errors not only, but serious bad practice in the aircraft production, and after consulting with the Secretary of War I wrote you that if that was your impression you were of course at liberty to examine any evidence that was in our possession.

I never at any time constituted you an official investigator. I merely gave you the right to look into the matter of your own motion, and I am sure that the letter which the Secretary of War provided you with gave you the same purpose and idea.

We have wished at every point to assist you and to make possible for you what you wish to do, but we have at no time regarded you as the official representative of the administration in making the investigation. If I had so regarded you I would, of course, have supplied you with such assistance as you feel you have lacked.

You will understand of course that I write this in the most cordial way and only because it is evident from your last letter that you have been laboring under a misapprehension.

I hope that you will be willing and that you feel that it is your duty to put at the disposal of those whom I have constituted official investigators all the evidence that may be in your possession. Cordially and sincerely yours,

WOODROW WILSON.

With Mr. Borglum's report which the President sent to Secretary Baker was attached the following letter:

February 1, 1918.

My dear Baker—Here is Mr. Borglum's preliminary report. Is there not some one entirely disconnected with aeronautics and from those who are prominent in carrying out the airplane program whom we can ask to go over this thing with an unbiased mind and give his naive impression of it? There may be something worthy of our consideration and suggestions worthy to be adopted. Cordially and sincerely yours, WOODROW WILSON.

Now the
RED CROSS DRIVE

$100,000,000 TO BE RAISED WEEK OF MAY 20-27

Not a cent of this $100,000,000 will be spent in salaries or other ways, but all will go into Red Cross supplies for the war

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For Every $1.00 Subscribed $1.02 Is Spent on Supplies

EVERY FACTORY SHOULD ORGANIZE AND EMPLOYEE DONATE

This drive represents a sacrifice; a gift of money and not a business investment as are the Liberty Loans

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LET US DEVELOP THE SPIRIT OF SACRIFICE

EVERY automotive factory must organize for the Red Cross drive. This will take place the week of May 20-27, during which time the Red Cross has asked for donations of $100,000,000. For every dollar subscribed the Red Cross agrees that not one cent will go to pay salaries, or rent, or other expenses, but that it will all go for the buying of medical supplies and for the use of our forces. In short, for every $1 subscribed there will literally be $1.02 expended in this manner. The extra 2 cents is interest.

The salaries and other expenses of the Red Cross are being maintained by Red Cross memberships and other funds, so that not a cent from this $100,000,000 is required for such purposes.

This Red Cross drive offers the grandest opportunity for Americanism to show its spirit of sacrifice. We have been investing in Liberty Bonds, but for every dollar we spend we are getting a guaranteed rate of interest, with a full assurance that all of the assets of Uncle Sam are back of the bond. There is no sacrifice in investing. It is really a good business opportunity.

With the Red Cross it is different. What we give during the week of May 20-27 we give outright. There is no 4¼ per cent interest rate. There is no bond that we can sell after a period of years. Our donations represent a sacrifice which we are making, and which we must make to take our proper share in this war.

Our soldiers and sailors have undertaken to sacrifice the greatest gifts of all, namely, life, if necessary, in this war. Surely we who stay at home can sacrifice generously of our dollars. It is our obligation as citizens. It is our duty in the Allied cause.

Every factory should organize to push a vigorous Red Cross campaign during the week of May 20-27. Every factory employee should make a subscription. There should not be a single exception in any factory connected with the automotive industries. We want our factory employees to stay home during the war. We need their labor in manufacturing the munitions of war. They are being paid in many cases greater salaries than ever before. Each and every one of these employees must do his or her share in this Red Cross drive. There must not be a slacker in any factory.

Detroit has already organized a local manufacturers' committee to work out a general plan to canvass all the larger factories. The Detroit quota is $7,000,000. H. M. Jewett, president of the Paige-Detroit Motor Car Co., has been appointed chairman of the committee.

Steel Shortage Threatens Automobile Curtailment

Steel Makers Sign Pledge to Fill Government Needs First, Otherwise Plants Will Be Commandeered—Restriction of Automobile Industry Not Yet Decided Upon

WASHINGTON, May 8.—Up to this time no final decision has been reached as to what production curtailment the automobile industry would be obliged to sustain to allow the Government additional steel for war needs.

The Government officials are asking for a serious specified curtailment to be announced by definite percentage figures. The leaders of the industry believe that the Government's requirements can be as well met by simply placing the automobile industry in a classification as a non-war industry, giving priority of steel to the Government and dividing what is left, after war needs are met, among the automobile and other non-war industries on a pro rata basis. The automobile men, after yesterday's conference, withdrew for further conference among themselves to-day, and after having arrived at a conclusion will report to the War Industries Board to-morrow.

Following the first meetings between the representatives of the industry and the War Industries Board and other Government officials yesterday the details were placed in the hands of two committees:

Representing the automobile industry: W. C. Durant, president General Motors Corp.; John N. Willys, president Willys-Overland Co.; Walter E. Flanders, president Maxwell Motor Co., and John Dodge, president Dodge Bros.

Representing the Government: J. Leonard Replogle, director of steel products, War Industries Board; Alexander Legge, Hugh Frayne and George N. Peek, all of the War Industries Board.

The present demand of the War Industries Board for curtailment in the automobile industry is due to the shortage of steel. This condition is the same as the one last November when the order went out to steel manufacturers to prohibit shipments of alloy steel to the automobile industry. Of late, Mr. Replogle has been declaring that too much steel is going to the automobile industry, and at the same time the war demands for the Allies and ourselves are so great that shipments to the automobile and other industries will have to give way to Government requirements.

In order to lay the steel situation clearly before all the steel manufacturers, Mr. Replogle held a conference with the steel men in New York on Thursday, May 2, and obtained from them a pledge that they would assure prompt production and delivery of the largest possible quantity of steel that is or shall be required by the Government for its own necessities and those of its Allies. They agreed that all other lines of business should be subordinated. This pledge was signed by more than 40 of the large steel producers in the country.

In defense of asking for such a pledge it was shown that some of the steel companies had not been giving the Government as much steel as the war situation called for, and that in some cases shell contracts for the Allies were many months behind, the inference being that non-war industries were receiving steel which should have gone for shell contracts. Some of the steel companies were criticised severely, and were frankly advised that if they would not live up to the pledge that their factories would be commandeered by the Government.

The War Industries Board has been checking up ingot production and finding out where every ton of ingots is shipped, so that any surplus of ingot capacity or pig-iron capacity may be discovered. The War Industries Board has declared it will go into the steel plants and take this pig iron, under a Government commandeering order, or will take the steel and give it to another steel manufacturer who needs it, if that other steel manufacturer is working on Government material.

The following orders waiting to be completed indicate the present demand for steel:

Rails—92 weeks' work ahead at the present rate of production.

Sheets—24 weeks' work on order.

Seemless tubes—27 weeks' work at the present rate.

Structural shapes—Notwithstanding curtailment of general building and construction, these mills are rolling projectile bars and are having difficulty in furnishing the necessary tonnage.

Merchant bars—28 weeks' orders.

Wire products—19 weeks.

All-steel products—31 weeks.

The curtailment policy of official Washington is regarded with question by many manufacturers and also by those Government officials who disagree with the present rather negative policy. One point developed in discussions here is that in the fall of 1917 the same officials who now demand curtailment then cried shortages and asked for production reductions. At that time the shortage claims were shown to be unwarranted. At this time there do not seem to be any definite statistics displaying a budget of war steel needs, of the automobile industry's exact steel requirements, or of the exact present output of steel, and the question is raised if the Government officials are not possibly in error again, exaggerating the situation, and may be curtailing the third largest industry seriously without cause.

Another point developed is that the industry uses approximately 5 per cent of the steel capacity of the country and that curtailment, while it seriously cripples an industry doing a business of $1,500,000,000, employing 500,000 men and controlled by 35,000 manufacturers and dealers, only results in giving the Government 2½ per cent or 3½ per cent more steel.

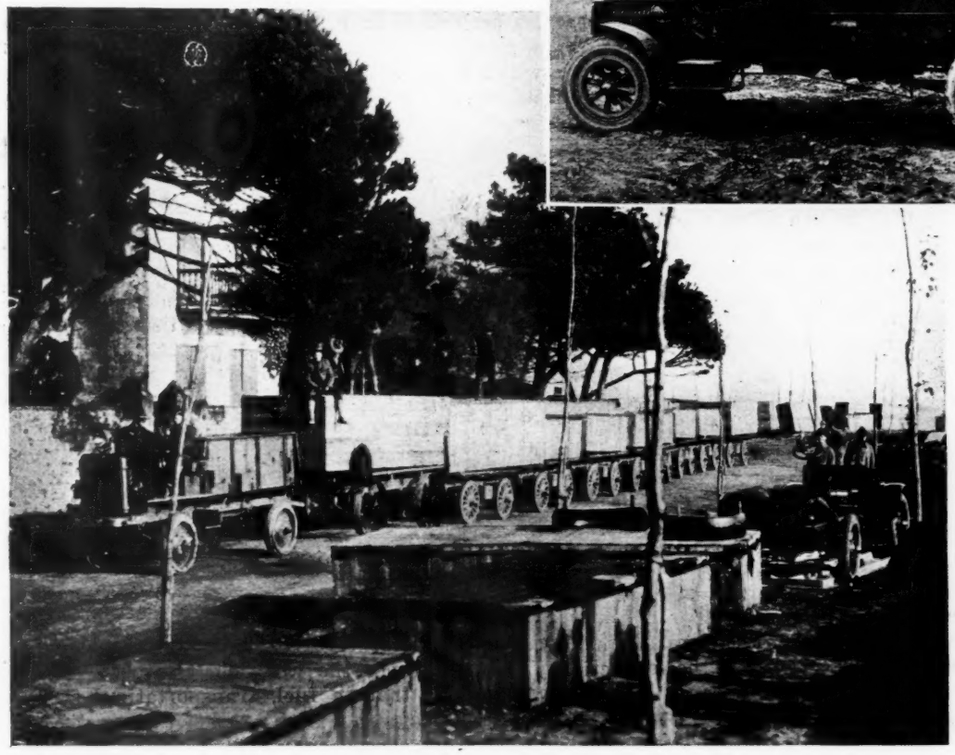
It is pointed out that the entire Governmental policy is in line with this present curtailment scheme; that in practically every instance the word don't is used more frequently than do; that in fuel, transportation, food, and production the policy is negative rather than positive.

The Army Truck Plays an Important Part in American Military Affairs

American marines entering a French village

Trucks going to the front with supplies for American troops

An American truck in the Aviation Service



Train of Nash Quads loaded with supplies for the front

Improvement in Engine Valves

New Valve Materials Adopted Partly as a Result of Scarcity of Tungsten—The Cooling Problem in Heavy Duty, High Speed Engines

By J. Edward Schipper

WHILE it has been the general tendency in automobile engineering to reduce the range of materials used for any particular purpose as time went on, a notable exception is to be found in valve materials. The tendency toward the small bore, high-speed engine, coupled with the difficulty of securing certain alloys (notably tungsten steel) which are particularly suited to this kind of work, has complicated the materials situation.

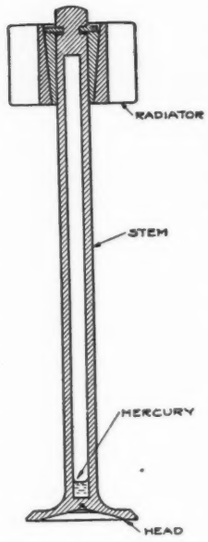
For these reasons it is a difficult matter to give any intelligent outline of the improvement in the materials for valves and the design of valves during the past 2 or 3 years. One fact stands out more than any other, however, and that is that never was there such a great variety of materials used and never has there been so much of a question as to whether the new materials are improvements for engines generally, or whether they merely perform the work in some particular engine to the best satisfaction of the engineer.

Some years ago valve heads were made either of cast iron, nickel steel, high percentage nickel steel or machinery steel. However, at the present time several other steels are also used, including 3½ per cent straight nickel steel, chrome-nickel steel of various analyses, chrome-vanadium and other special alloys, not to mention the high and low-tungsten steels and some special high-chromium steels. From the viewpoint of the engineer all of these materials have certain qualities that make them preferable to any other material. Then, again, the engineer is not always able to use the material he would like, on account of the cost and difficulty in delivery.

Airplane Service

As the most strenuous service for valves is found in airplane engines, what is typical of modern practice can, of course, be found in this use. The type of valve used in airplane work is always of the solid forged, one-piece type, and it is generally made of one of the many grades of alloy steel. The high-grade trucks are quite similar in this respect and their specifications generally call for alloy steel valves. It is quite evident from these statements that when an engine is designed the materials for valves have much to do with the location of the valves, the shape of the gas passages, the shape of the combustion chamber and the speed characteristics of the engine.

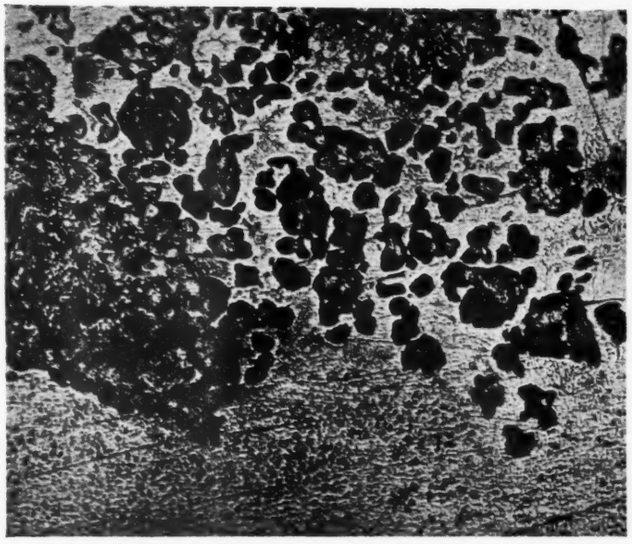
Almost as important as the subject of material is the question of the design of the valve itself, and valve manufacturers are practically unanimous that there has been improvement in respect to the proportion between stem and head diameters. As one manufacturer puts it, "A 1⅞-in. head diameter now calls for a stem of approximately ⅜-in. diameter, whereas 2 or 3 years ago the valve manufacturer was called upon to make a great many valves that would have a head of 2½ in. and a stem of ⅜ in." It is generally believed by valve manufacturers that service can be greatly increased by maintaining a fair proportion between the size of the head and the size of the stem and thus insure a mechanically strong valve. Manufacturing difficulties have been reduced by introducing greater uniformity in design. Most valves now have an oval top instead of half being oval and the other half flat, and there is a small percentage of cupped valves.



Kettering mercury-cooled exhaust valve

Better spring retainers are now used, largely as a result of European influence. The new retainers either use a groove or have the valve stem threaded on the inside or outside. Valves are designed with a view to light weight, and by more rational distribution of material it is sought to maintain their mechanical strength. In the welded type of valves, where the head is of one material and the stem of another, it is of the highest importance to have a dependable joint. The two microphotographs herewith are shown by one of the valve companies to bring out the merits of its process in joining the head and stem. This particular valve, which is made by the Pfanstiehl Co., Inc., has its head punched from a sheet of steel containing 17 to 20

Ordinary weld, the tungsten steel showing light and the carbon steel dark



Pfanstiehl weld, tungsten steel showing light and carbon steel dark

per cent tungsten and 1 per cent vanadium, with percentages of chromium, carbon and silicon. By punching the head from the sheet in this manner, it is claimed, a very light head is obtained.

When the valve is closed the heat is dissipated through the valve seat, which is generally in close proximity to the cooling water, but when the valve is open the heat is absorbed by the head, and for this reason, it is pointed out, the amount of metal in the head should be kept as small as possible in order to reduce the amount of heat which is absorbed by the valve and which must be dissipated while the valve is closed through the water-cooled seat.

It is necessary that the valve should be kept cool because an overheated valve will not work satisfactorily, on account of the difficulty of maintaining lubrication. The metal used in the stem should also have a relatively low coefficient of expansion in order to permit of a tight fit in the guide without danger of the stem seizing after the valve has heated up.

A new valve invented by C. F. Kettering of the Domestic Engineering Co., Dayton, Ohio, has a mercury cooling feature. It is particularly intended for exhaust valve purposes on farm lighting plants, and it is suggested that it may be of practical value for airplane purposes. It is pointed out that the temperature of the exhaust gases is about 1800 deg. Fahr., and a racing or airplane engine very frequently runs with the valve stems red hot. This is due generally to the limited radiation by means of the valve guide. For this reason it has been necessary to use the best heat-resisting alloy steel in valves for this type of engine, and even then it has been found difficult to get valves to operate more than 100 hours in this service without regrinding.

It was to eliminate this trouble that the Delco-Light mercury cooled exhaust valve was brought out, and it is claimed that this valve requires no regrinding after months and years of continuous service, and that it does not warp.

The mercury, as shown by the illustration herewith, is contained within the hollow valve stem, and the effect is to transmit the heat from the hottest part of the valve up to the portion of the valve stem which is exposed to the atmosphere. The valve stem is fitted with a series of radiating fins to facilitate cooling. At normal temperatures the mercury is in a liquid state and lies at the bottom of the valve stem. As heat is absorbed by the valve and transmitted to the mercury, the latter is vaporized and rises to the upper, cooler end of the valve stem, where it condenses, and it then flows back to the bottom of the stem to again be vaporized.

In the improved construction of the valve, the tubular stem is welded to the head. The mercury is then poured into the hollow stem and the top of the valve is plugged and the plug welded in place so as to make an air-tight joint. The aluminum radiator which is secured to the top or exposed end of the valve stem is held securely in place by a split tapered sleeve.

It is quite probable that the next few years will see marked changes in valve practice, both as regards materials used and design. The fact that we have so many types at the present time indicates that we are in a period of change in this respect.

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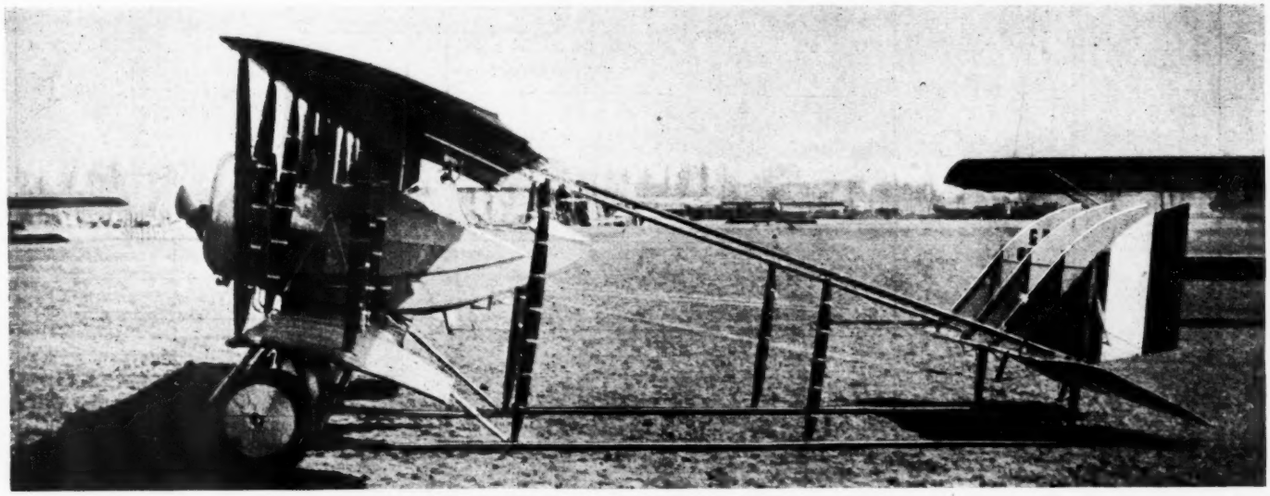
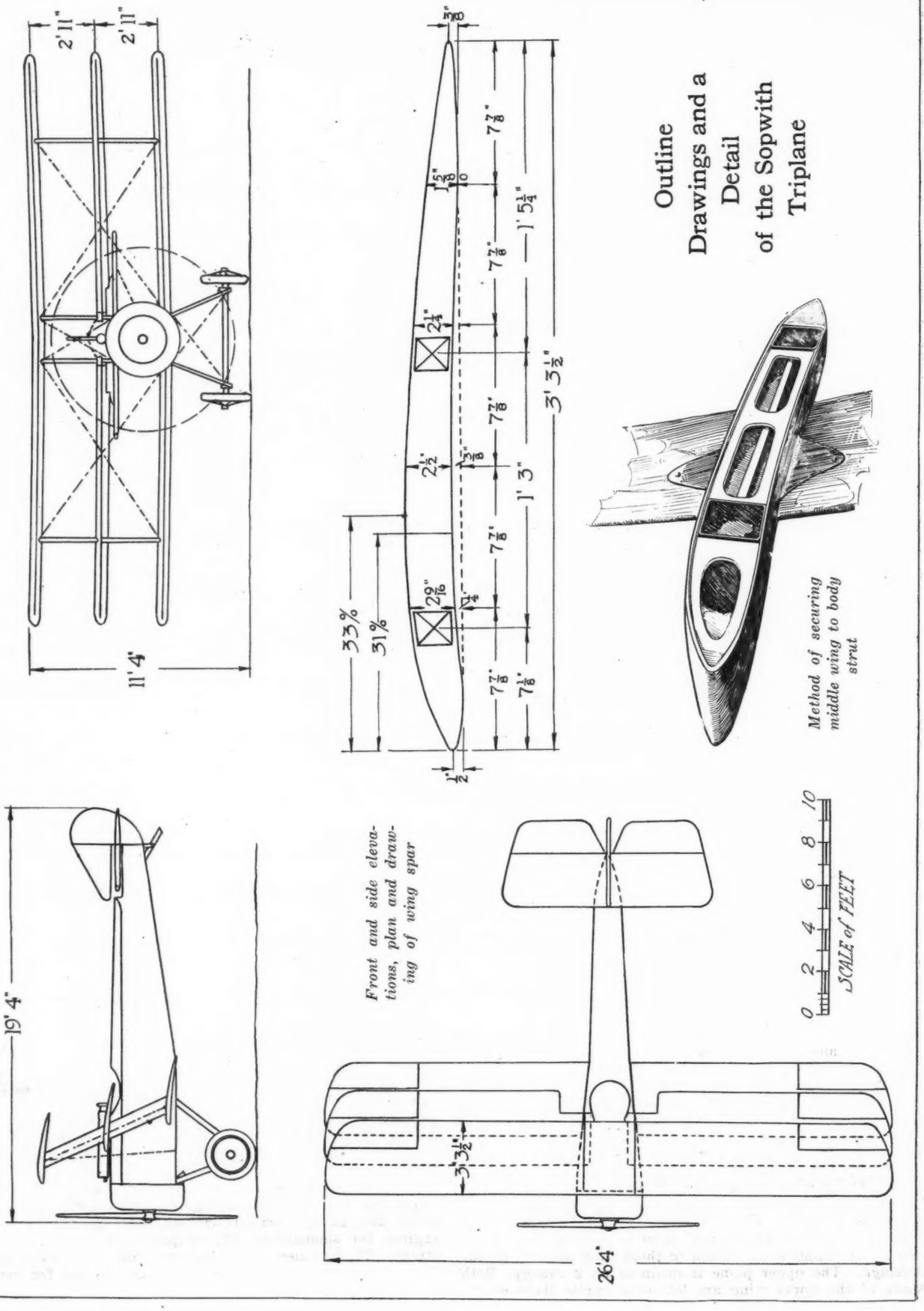
AN airplane mail service was started between Petrograd and Moscow, Russia, on March 31. The distance is 400 miles and the first trip was made with a load of 300 lb. of mail matter inside of 5½ hr. Four airplanes now fly daily in both directions and service between other cities is contemplated. The postage is $1 per letter.



A type of French hunting plane, which has a peculiar short body, known as the Caudron type G. It is especially designed for reconnaissance purposes

Outline Drawings and a Detail of the Sopwith Triplane



Method of securing middle wing to body strut

Front and side elevations, plan and drawing of wing spar

The Sopwith Triplane

New British Scout Has Low Specific Wing Load and Excellent Climbing Abilities —Middle Wing Cut Away Near Fuselage to Improve Pilot's View

HAVING published in a recent issue particulars of the Fokker triplane we are now following this up with a description of the British Sopwith. The information on which this article is based comes to us in a rather roundabout way. It appears that the Germans captured one of these Sopwith machines and a description of it appeared in German aircraft journals. A translation of these articles appeared in *Flight* of London, the copy of which containing the matter has just been received.

The Sopwith is said to have been the first triplane to come into practical use, for after not very successful experiments by Hans Grade in Germany in 1907, A. V. Roe in England and Goupy in France, this type of construction was abandoned. What caused the reversion to the triplane type of construction was probably the small span it permits of and that the aspect ratio can be kept moderately high for a machine of short span. The Sopwith has a span of 24 ft. and a gap of 3 ft.

Light Wing Loading

Owing to the light loading of the wings it is possible to construct the wing spars considerably lighter, and still have a comparatively great free length of spar. In the case of the Sopwith triplane this length is about 9 ft. with an overhang of 4.4 ft. The weight of the total wing area will therefore scarcely come out greater than in the case of a biplane of the same area. Possibly also the arrangement of the wings is advantageous as regards the view obtained by the pilot, as the middle wing is about on a level with his eyes, and the upper and lower wings, on account of their small chord, do not obstruct the view to as great an extent as the wings of the ordinary smaller biplane having a greater wing chord. While both lift wires pass in front of the middle wing, the landing wire runs through it. The bracing cables for the body struts are crossed in the case of those running forward to the nose of the machine, while those bracing the struts in a rearward direction are straight. The gap between the wings is 35 in., and the stagger is about 25 per cent. All the wings are fitted with wing flaps connected by a vertical steel band. In the nose the body carries a 110 hp. Clerget rotary engine, inclosed in a circular cowl, which projects below the body in order to allow the air to escape.

The body is of rectangular section, rounded off in front by means of a light wooden framework in order to make it merge into the curve of the engine cowl. The width of the *fuselage* is 27.5 in., and it tapers to a vertical knife-edge at the back, to which the rudder is hinged. The elevator is in two parts, and has in front of it a tail plane of about 10 ft. span, which, as in all Sopwith machines, can have its angle of incidence adjusted during flight.

Built in Two Types

The triplane is built both as a single-seater and as a two-seater, and has always a fixed machine-gun in front above the *fuselage*, and in the case of the two-seater another machine-gun operated by the observer. This increases the weight of the two-seater by about 220 lb.

The under-carriage consists, as in all Sopwith machines, of two V's of steel tubing and a divided wheel axle, the hinge of which is braced from the *fuselage*.

The following remarks are taken from the *Flugsport:*

The *fuselage* with tail plane and rudder is the same as that of the small Sopwith single-seater biplanes. The three wings have a span of 26.5 ft. and a chord of 3.28 ft. The lower and middle wings are attached to short wing sections on the *fuselage*. The upper plane is mounted on a canopy. Both spars of the upper wing are left solid, while those of the lower and middle are of I-section. The interplane struts, which are of spruce, and of streamline section, run from the upper wing to the lower wing and the inner ones from the upper wing to the bottom rail of the *fuselage*. In order to give a better view the middle wing, which is on a level with the pilot's eyes, is cut away near the *fuselage*.

Streamline wires ¼-in. in diameter are used for the wing bracing. The simply arranged landing wires are in the plane of the struts, while the bracing of the body struts as well as the duplicate lift wires are taken farther forward. From the rear spar of the middle wing wires are run forward and rearward to the upper rail of the fuselage and the lower wing also has a wire running forward to the lower rail of the body. All the planes have wing flaps, and inspection windows of celluloid are fitted over the pulleys for the wing flap cables.

The engine is a 110 hp. Clerget, and the gasoline is led to it by means of a small propeller air pump mounted on the right hand body strut. In the pilot's seat were the following instruments: On the right a hand wheel for varying the angle of incidence of the tail planes, a hand-operated air pump and a fuel gage; in the middle an air speed indicator, manometer, a clock, tachometer and switch on the left, a fuel valve, lever for regulating the air and a lever for regulating the fuel. The weight of the machine empty was found to be 1080 lb. Assuming the useful load to be 440 lb. gives a total weight of 1520 lb., which with a supporting area of 238 sq. ft. gives a specific load of 6.4 lb. per square foot.

Further, the following particulars are given: Engine, Clerget, nominal hp., 110; brake hp., 118; fuel capacity for 2 hr., 22.5 gal.; oil capacity, 6 gal.; area of wings and flaps (sq. ft.), upper 85, middle 75, lower 77, total 237; area of elevators 3.2, of wing flaps 11.8, of rudder 4.4. Angle of incidence (degrees): upper wing, root + 1, tip, — .8; middle, root, + 1.5, tip, 1.5; lower, root, + .5, tip — .5; tail plane, variable, + 2 to — 2 deg. Loading per sq. ft., empty, 4.56 lb., fully loaded, 6.42 lb.; loading per brake-horsepower, empty, 9.1 lb.; fully loaded, 12.9 lb.

Weights	Lb.
Fuselage with under-carriage and accessories	272
Wings	297
Tail plane, rudder and elevator	18.6
Engine	352
Fuel tank	33
Oil tank	19
Propeller	35
Engine accessories	35
Mounting	6.6
Pilot	176
Gun and ammunition	88
85 litres of gasoline and 23 litres of oil	176
	1508

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IN a recent paper by T. N. Everett, read before a British technical society, the following data on weights of power plants were given: Triple expansion steam for cargo boats (no boilers or auxiliaries), 130 lb.; triple expansion steam, including boiler and auxiliaries, 450; Diesel engines for cargo boats (no auxiliaries), 259; Diesel engines with all auxiliaries, 400; turbines with boilers and auxiliaries, 200; Diesel engines for submarines, 50; reciprocating engines for destroyer, 35; turbines for destroyers, with boilers, 30; gasoline engines for motor cars, 15; gasoline engines for racing boats, 7½; aircraft engines, 2½.

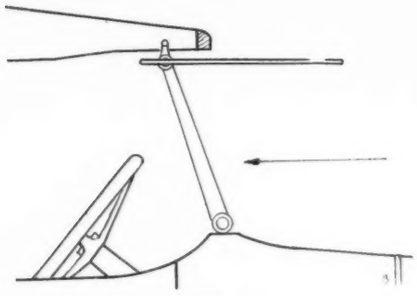


Fig. 8

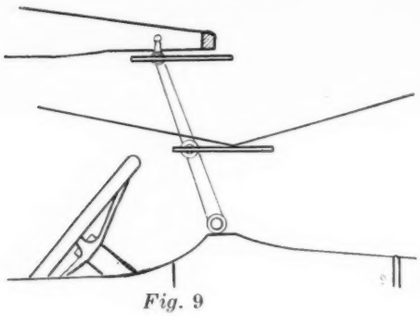


Fig. 9

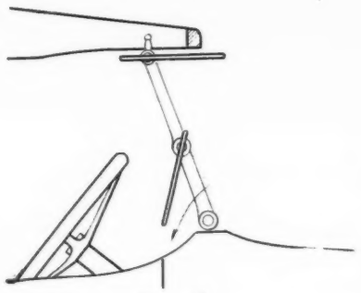


Fig. 10

Design of Automobile Glass Fronts

Part II

How the Clear Vision, Ventilating and Non-Reflecting Features Are Secured — Defects Found in Designs of Windshields Now Used

By Karl Feilcke

ANOTHER open position of a one-piece windshield is shown in Fig. 8.

With the two-piece shield an absolutely open position may be attained by putting the glass plates as shown in Fig. 7.

This position, however, is rarely used because the lower glass reflects the sun rays under certain conditions, especially in the morning and late afternoon, in such a manner that they strike the driver's eyes, blinding him completely at times.

For this reason the position shown in Fig. 10 is most frequently used. It is a combined open and ventilating position and really better than the plain open position, as part of the air current is deflected downward into the body.

The most extreme form of the open position, that is the one with the shield folded clear out of the way and with the top down, as shown in Fig. 6, can only be used to advantage in fair and windstill weather and on dustless roads in order to get the full benefit of the breeze caused by the movement of the car. Owing to the dust and dirt prevalent in the atmosphere of our cities this position is not often used nowadays, and many designers construct their glass fronts so that they cannot be laid down at all. Under certain conditions, however, in the country or at the seashore, for instance, the down position of the shield adds much to the pleasures of motoring, especially during the torrid season.

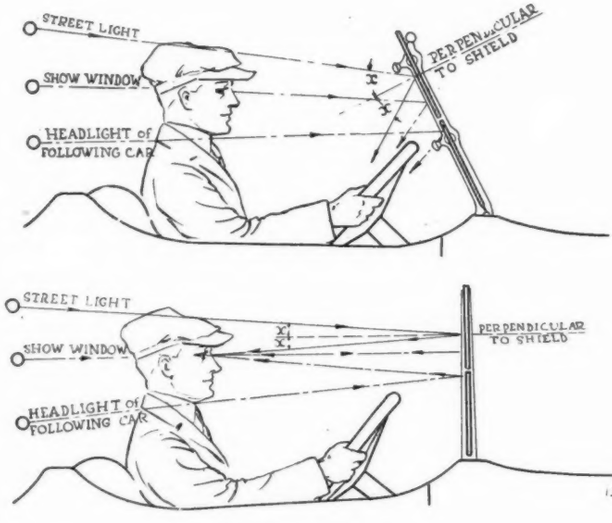
Experience shows that the different positions of the glass plates listed above—upright, clear vision, ventilating and open—take care of all possible weather, road and driving conditions, and insure the performance of all the functions demanded in our definition.

As indicated in the different illustrations given herewith, all these positions can be realized with the shield tilted slightly backward. This tilting of the glass plates brings with it several decided advantages, which can be summarized as follows:

All light rays coming from the rear are reflected downward and do not strike the driver's eyes, as is proven by a comparison of Figs. 11 and 12.

These figures are drawn in accordance with the well-known optical law that the angles of incidence and reflection are equal and show clearly that while on the perpendicular glass the reflections of many light rays strike the driver's eyes, such is not the case with the tilted shield.

This is a great advantage on open cars which are frequently driven with the top down. It does away with all irritating and confusing reflections and gives the driver at all times a clear view with the glass in plain upright position. It is of special advantage when driving at night through brightly illuminated city streets and also improves conditions during the daytime when driving into a comparatively dark garage or under a railroad viaduct. In the latter cases practically all the light comes from the rear only for a moment and the reflections are liable to blind the driver completely when a perpendicular shield is used.



Figs. 11 *and* 12

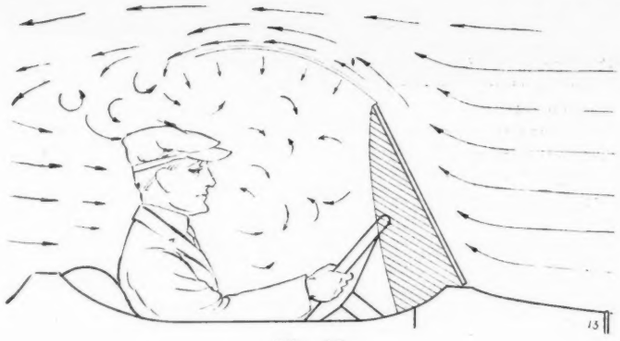


Fig. 13

The angle of inclination theoretically necessary to avoid all light reflections from interfering with the driver's vision is the one at which the line drawn from the driver's eye to the highest point of the glass is normal to the latter. Actual practice shows, however, that a smaller angle is sufficient, for if the shield is tilted back at all the only dangerous light rays are those coming from below (headlights of cars behind, low show window lights, etc.), and most of these are caught by the rear end of the body. An angle of inclination of about 15 degrees is usually ample, provided the upper glass cannot be moved backward. This is one of the reasons why the upper glass should never be used for ventilating purposes.

Closer to Driver

Another advantage of the inclined shield is that it comes with its upper edge several inches closer to the driver than a perpendicular one put on the same car. As the extension of the low pressure space back from the shield is determined by the upper edge of the glass plate the driver is considerably more within the eddy zone when an inclined shield is used and consequently better protected against the inevitable and disagreeable back drafts. This becomes clear by a comparison of Figs. 13 and 1.

The inclined shield makes it also possible to use a shorter and lighter top, which saves cost and weight and incidentally increases the driver's field of vision, a great advantage on cars used much in dense traffic or on hilly roads (see Fig. 14).

A comparison of the two dimensions *a* and *o* in Fig. 15 shows that in order to overlook the same stretch of road with the glass in clear vision position a smaller slot is required on the inclined shield than on the perpendicular one. This, of course, keeps the cold air, rain or snow out more effectively and increases the comfort of the passengers.

Improves Appearance of Car

The last point in favor of the inclined shield is that it improves the appearance of the car, for it is undoubtedly more in keeping with the now firmly established streamline style of body.

The advantages of the inclined shield over the perpendicular one enumerated here are so obvious that they account for the almost universal adoption of the slanted shield during the last two years. There can be no question that the inclined shield will soon be used exclusively, and for this reason we will restrict our further investigation to this type of glass front.

Having defined the functions which the glass front of a modern automobile should perform and shown the technical means by which the performance of these functions is attained, we are now in a position to make a survey of the existing glass fronts and see whether they are designed and constructed in accordance with the principles we have developed here or not.

B. Description and Criticism of the Glass Fronts Used on Modern Cars and Remedies for the Defects Found

At present two main types of glass fronts are in use—the one-piece and the two-piece shield. Their general construction has already been explained and it remains therefore only to describe the details.

On both types of shields the glass plates are assembled in frames and supported by means of journals on two side arms, which are attached to the body. The plates are turned into their different positions with the aid of these journals, and the locking of the latter by hand operated wing nuts, or automatically operated notches, holds them securely in whatever position they are put.

Comparatively air and water-tight connections between the framed glass plates and the side arms, body, top or side curtains are attained with the aid of rubber strips, curtain fasteners and flaps arranged in the top.

The front end of the folding top is anchored to the windshields by means of brackets located on the front bow of the top and clamped to extensions on the upper ends of the side arms.

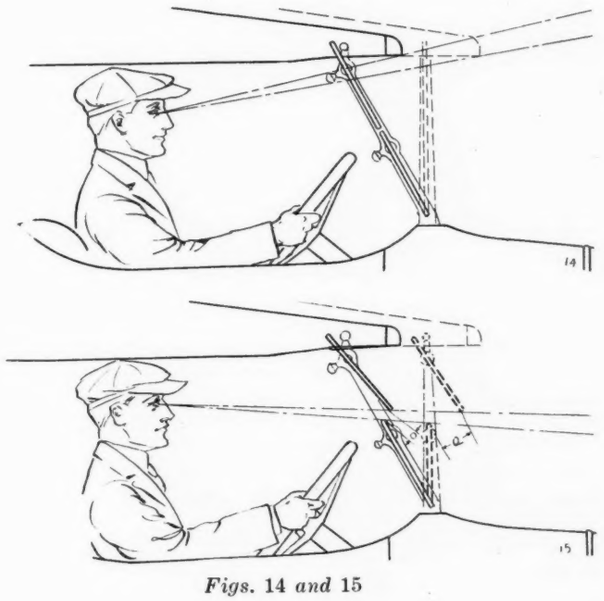
The side arms of the one-piece shield are sometimes rigidly fastened to the body, but can in the majority of cases be turned in joints located at their lower ends, and the journals of the glass plate are usually located at the upper ends of the side arms. The one-piece shield is light, cheap and simple in operation, but it has one serious defect: It cannot be put in a clear-vision position. To obtain something equivalent to the latter, the glass plate has to be put up so high that the driver is exposed to the discomforts of the weather, which makes this position impractical (see Fig. 16).

This defect is the cause of the gradual elimination of the one-piece windshield. It is still used on a few cars, but will undoubtedly disappear in the course of time.

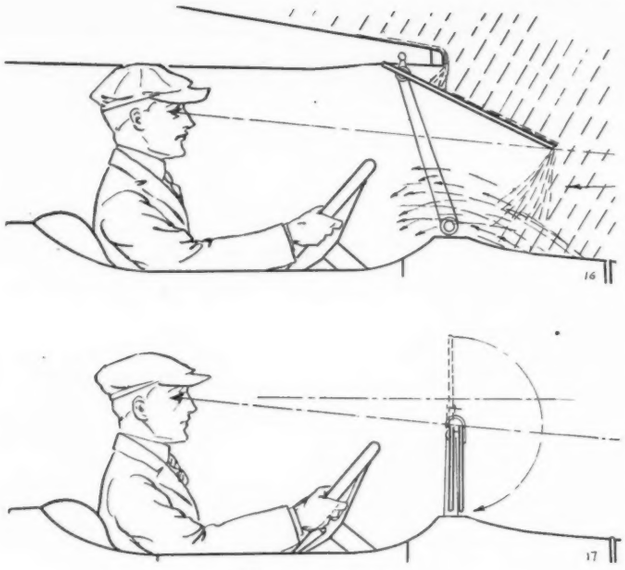
According to the construction of the side arms, three main types of two-piece shields can be distinguished:

1—Those with joints at the lower end of the side arms.
2—Those with joints at the center of the side arms.
3—Those with rigid side arms.

The first type represents the most universal and theo-



Figs. 14 *and* 15



Figs. 16 *and* 17

retically ideal glass front, as it can be put in any of the positions mentioned above. It is, however, rather complicated and expensive, and for this reason only found on a few cars.

The second type is more frequently used. If properly constructed it can be put in an upright, a clear-vision, a ventilating and a peculiar half-open position attained by folding the upper half of the side arms and the upper glass by means of the center joints in front of the lower half of the side arms and the lower glass (see Fig. 17).

This particular kind of glass front is used on some of the cheapest cars with a stationary lower glass and the upper glass fixed so that it cannot be put in clear vision. It is in that simplified form the survivor of the original two-piece shield. When properly constructed it is rather complicated on account of the proximity of the center side arm joints to the journals of the lower glass, and as the half-open position shown in Fig. 17 has no particular merits, this type is being abandoned by most car manufacturers in favor of the rigid side-arm type shield.

The latter has no joints whatever in the side arms, and can be put in the upright, clear-vision, ventilating and combined ventilating and open position shown in Fig. 10, which positions apparently solve the glass-front problem to the satisfaction of the great majority of motor car users. It has become of late practically the standard type of glass front, and the critical analysis to follow will, therefore, be mostly concerned with this type as found on up-to-date cars.

(To be continued)

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Borst Truck Chain

UNUSUAL in design is the anti-skid chain for motor trucks which has been perfected by A. J. Borst, Jr., Buffalo, N. Y. This outfit is made up of flat, ground-gripping links which are made into a chain passing over the truck wheel and an auxiliary wheel. The use of the auxiliary wheel is the novel part of the device. This is a revolving drum fitted on a bracket attached to the side of the frame. The bracket and drum arrangement is equipped with a tension spring by which the slack of the chain is adjusted.

Two of these outfits, one for each rear wheel, are needed for each truck making the installation. The chains are built to fit a 6-in. single tire and a 12-in. double tire; other sizes are being developed.

Book Review

Steel and Its Heat Treatment, by Denison K. Bullens. Second Edition. Published by John Wiley & Sons, New York. Price, $4.

No branch of metallurgy has made such progress during the past two decades as heat treatment and the older works on metallurgy furnish very scant information on this subject. In fact, as the author says in his preface, much secrecy surrounded the subject in earlier times. With alloy steels heat treatment is quite essential, as without such treatment most of these steels have very little advantage over the less expensive carbon steels. It was the automobile which led to the extensive use of steel in machine construction, and probably the biggest factor in the abolishment of secrecy in connection with steels and their heat treatment was the standardization work of the S. A. E.

Mr. Bullens' work deals with the subject in a thoroughly practical way. In the opening chapter are discussed the various tests to which steel may be subjected. This subject is handled in a concise way, the object evidently being to give the reader an idea of the significance of the various test results. Next follow chapters on Heat Generation and Heat Application, in which the furnaces used for heat treatment are dealt with. After a chapter on the Human Element follows a series of chapters on the various heat treatments, including annealing, hardening, tempering and toughening, case carburizing and case hardening. Next the different types of steels are taken up successively, the effect of heat treatment on each being explained and the usual treatments for different purposes given. In the new edition a chapter on the treatment of high-speed steels has been added. The work is well illustrated, mainly with photo-micrographs. That the book meets the requirements of men engaged in this line of work and of students is shown by the fact that a second edition was called for in less than two years.

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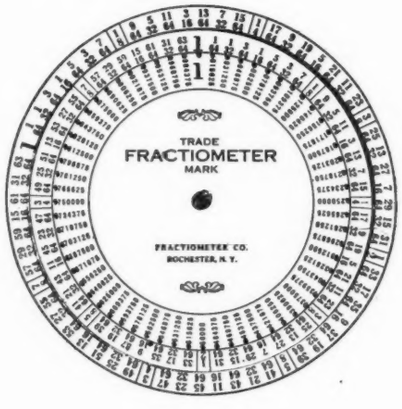
Novel Adding Device

AN instrument designed as a help in adding and subtracting common fractions has been devised and is marketed by the Fractiometer Co., Rochester, N. Y. It is of particular use in the drafting room, where much addition and subtraction of fractional values have to be done. The device consists of two celluloid disks, the outer being held by the hand while the other one is rotated to the desired position. The disks are first turned so that the figures 1 come under each other; fractions may then be added as follows: To add ⅛, 3/32 and 27/64, place a pencil point in the hole on the inner disk below ⅛ and move the disk until the point is under the 1 on the outer disk. Next take the hole that comes opposite 3/32 on the outer disk and bring that under the one on the outer disk, and similarly for the last fraction, 27/64. The answer, 41/64, will be below the 1 of the outer disk.

In subtracting, one starts with the larger fraction on the inner disk and brings it under the small fraction of the outer. The difference can then be found under the 1. Another convenient feature is the decimal equivalents under the fractions of the inner circle.



Foreign Trade Development

Enormous National Debts Will Not Prevent Industrial Growth —Neutrals, Cut Off by Embargoes, Have Developed Their Own Industries — Problems of Trade in Foreign Countries

THOSE who imagine that European nations may be bankrupt after the war, and so not in a strong position to pursue foreign trade and take up the thread of their export business where they had to drop it when the war started, should bear in mind that in 1865 when the United States carried a national deficit of $7,000,000,000 European countries took it for granted that we would go bankrupt. They did not reckon with the resources and inventive genius of our country and people.

Necessity being the mother of invention, the brains behind our country got together with the result that it was pointed out that there were twelve states out west rich in minerals of all kinds and susceptible to enormous development. The work began. Gold and silver, virtually the needed money, were dug from the ground in ever increasing quantities. Transcontinental railroads were put through, which in turn developed the enormous agricultural possibilities of our Western plains. These in turn yielded harvest which brought additional funds to our coffers, and we by industry eliminated the debt of $7,000,000,000.

This, from an address by Robert S. Alter, of the American Tool Works Co., before the Fifth National Foreign Trade Convention in Cincinnati, gives a picture of the condition of the country following the Civil War that we cannot pass over lightly. The picture that European countries had of this country in 1865 after the Civil War is much the same as the one we have of these European nations. We picture them as being bankrupt following the war. European nations in this war are learning the same lessons that we learned in the Civil War. They are going to meet their war obligations and they are going to do it along the same lines that we did it 50 years ago.

Colossal National Debts

The national debt of our Allies at the end of this year will be colossal. It is estimated that Great Britain's debt at that time will be $50,000,000,000, or practically one-half of the nation's wealth. Great Britain is not crushed under the weight of this obligation. She knows exactly what she is going to do to pay it. Great Britain has taken steps to carry out extensive developments in her various colonies. Development possibilities in Canada alone are so enormous that legislation has recently been passed whereby 10,000,000 Chinamen will be allowed to emigrate and will be employed in building railroads, cultivate the soil, and at other work, at the insignificant wage rate of 62½ cents per day. This shows exactly what Great Britain intends to do in the way of future development.

Similar plans are under consideration with other countries and their colonies. Some are also planning the development of the vast agricultural and mineral possibilities of South America. However, we should not be alarmed over the possibility of this extensive program working against us, provided we are willing to lend ourselves to the general scheme. It might be advantageous for us to co-operate in giving financial assistance to the work of reorganizing those countries which have been hard hit by the present conflict, thereby gaining their support in trade on a reciprocity basis. America is in an excellent position to render this assistance on account of the huge gold reserve which we have accumulated. This gold reserve will be immediately available upon cessation of hostilities, and will give America the first opportunity to reap the benefits derived from this source. The extension of the American banking system, which is rapidly taking place, will offer great help in guiding and assisting credit extensions to countries needing same.

An Allied Commercial Union

If the Allies can hold together after this war, the combination will form an organization consisting of practically three-fifths of the land of the world, three-fifths of the population and mineral resources, and a string of colonies extending around the world. With such co-operation, German interests will find a worthy competitor.

The trade situation with neutral countries after the war will be unique, according to the information I have collected on this subject. The export restrictions against them have made it difficult for the neutrals to import the articles which they formerly secured from abroad. This has forced them to cultivate their own fields to obtain food, and to develop their own mineral resources to secure necessary raw materials for home requirements, as well as war orders, the latter being quite profitable.

This industrial development has increased the number and size of manufacturing establishments to a remarkable degree. When the war is over, they will be better able to take care of themselves than formerly, independent of outside assistance, and, besides, a market must be found by them for the overproduction. Neutrals, therefore, are looking more than ever to export possibilities for their own commodities, and are coming to a broader understanding of their own capabilities toward self-preservation and securing world trade.

Scandinavia a New Competitor

Let us take the Scandinavian countries as an example. These countries, in the past, have been large importers of all kinds of material, particularly manufactured products. Denmark, Norway and Sweden have recently invested $270,000,000 in factories which will directly compete with American firms, not only in their own countries, but in the world at large. These factories are manufacturing chiefly such goods as emery wheels, twist drills, taps, dies, engine lathes, planers, shapers, chucks, files, hammers, axes, shovels, ball-bearings, railway supplies, wood-working machinery, automobiles, harvesting machinery, shoe machinery, lumber machinery, and many other classes of commodities.

The raw material for the manufacturing of these prod-

ucts is obtained very largely from Sweden and Norway, and the production of these industries is arriving at such a high degree of efficiency that they can more than supply the home consumption. An investigation of the conditions in these countries would lead to the belief that after the war the prices will be considerably lower than those prevailing at present, not only on account of the reduction in the cost of raw material, but on account of constantly increasing efficiency of manufacturing organizations.

For this reason they are fully expecting to compete in a most energetic and intelligent way against American and European firms, who will feel their competition in Russia and Asia, as well as the greater part of Europe. In addition, the Scandinavian countries have the advantage of being closer to the majority of these markets than the American firms. The embargo against Scandinavian countries, while admittedly a war necessity, has nevertheless developed in those countries a new and determined competitor in foreign fields.

War Embargoes

Scandinavian customers had a leaning towards American products, and it is regrettable that war conditions have forced us to curtail shipments to them. Tonnage has been available, because the Scandinavian countries are employing a considerable part of their large merchant marine for the war requirements of America and her Allies, a certain amount of this tonnage being used for traffic between this and their countries.

In recent months several boats have left for Scandinavian ports with passengers, but practically empty so far as cargo was concerned, although goods for Scandinavian countries filled certain New York warehouses. One large Danish steamer recently sailed for Denmark with passengers, but otherwise practically empty. It is certainly unfortunate that various associations in Denmark, Sweden and Norway have not been able to fully satisfy our Government that American goods imported into those countries would not be re-exported to the enemy, as otherwise our products would have been established in those countries to a degree difficult to enjoy at any other time.

German activity in those countries is bound to militate against us, under these circumstances, and the development of home industries is creating a condition which, unless very energetic steps are taken to retain our trade, we shall find in Scandinavia a competitor for our goods where formerly we had a customer.

New Problems Will Arise

We see that the export trade problems of the past will likely not be identical with those of the future, after this war has ceased. America should realize this, and we Americans should give the best of our thought, individually and collectively, in an endeavor to ascertain just what the requirements will be to develop and maintain that vast amount of foreign trade obtainable after the war, claimed by many to be within easy reach of us all.

As we are aware, those countries which constitute not only our Allies, but our enemies, have a degree of governmental assistance and support to their commercial activities that we Americans in the past have not had the pleasure of enjoying. That this support is an absolute necessity for the future commercial welfare of our country is self-evident; and individuals are giving the matter serious thought.

In these times, when we are face to face with the tremendous power of the governmental commercial cooperation wielded by so many foreign countries, and when we are face to face with the fact that this governmental aid will likely be steadily increased, the urgent need of the same system for us is instantly apparent, if we are to be successful in the race for foreign business in the future.

The advantages obtainable through the operation of the Webb Bill are too far reaching to permit of discussion by me at this time.

While we have a Department of Commerce which is making an honest effort to render service to American manufacturers in exporting their wares throughout the world, yet it is significant that to date there is not a single special organization to enter upon this work. Consequently, there is no agency to pool the findings of such an organization, which, consolidated, would give to us suggestions as to what policies to adopt in dealing with the peculiar competition that we shall have to face.

The countries now at war are all facing an enormous national debt. These countries, therefore, have economic reasons why they as nations, and also as individuals, must develop not only their home industries, but also their foreign trade. This will be accomplished in many ways; for example, by reducing imports wherever possible, and by the development of their home industries to such a degree that increased exports will be made possible on the basis of over-production.

Skoda Works Preparing for Peace

Many large plants now confined to the production of war material will be utilized for other purposes when peace comes. According to a recent consular report the Skoda gun plant of Pilsen, Bohemia, expects to control the farm implement trade in Russia and the Balkans after the war, and has already made preparations for the conversion of its gun plant as soon as peace is declared. The report states that plants connected with the Skoda works already have quantities of machines which are to be shipped into Russia as soon as the border is opened. The Skoda works are counting on the neutralization of the Dardanelles and a resulting increase of traffic on the Danube which has caused them to prepare to build motor boats for export to Turkey and Bulgaria. One part of the plant is to be converted into an automobile and airplane factory, while another part will continue to manufacture war materials.

The uncertainty as to the volume of business which we will secure from Europe after the war brings up the old axiom, don't put all your eggs in the one basket. The logical thing is to go after new markets with the least delay. Now is the time to start our propaganda in virgin fields, as it takes time for seed to grow and still longer to reap the harvest. The crops from fields that we have cultivated for years may now yield the utmost, and the safety of our export business may depend upon orders from new markets.

Building Up Export Trade

In building up his export trade the exporter must first of all consider the market in question from the standpoint of its buying ability for his particular commodity. Much money is wasted every year, and export campaigns do not bring fruit, simply because the firms behind them neglect to study the market.

The matter of climate and altitude should not be overlooked. There is a good market for heavy overcoats in Mexico City because of its altitude, regardless of the fact that it is far south of us. Many centers of population in tropical countries are situated in altitudes which give them temperate atmospheric conditions.

The occupation of the people will indicate the needs

(*Continued on page* 917)

SIDE GUIDE & GRIPPER

Patch Self-Locking Differential Gear

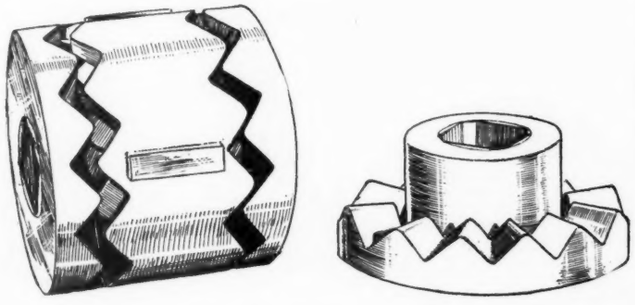
Employs Concentric Splined and Toothed Sliding Rings to Give the Differential Action

A NEW self-locking or anti-spinning differential gear of a rather ingenious type has been invented by Harry M. Patch of Seattle, Wash. A longitudinal section and an end view are shown in one of the illustrations herewith. The differential comprises the usual casing, driven ordinarily by bevel gears, which is carried in bearings in the usual drive gear housing. On the inner surface of the cylindrical part of the casing are cut a number of splines which serve to drive a number of concentric splined rings. These concentric rings, being splined to each other, cannot rotate but are free to move axially with respect to each other. These rings have teeth of a special form on their opposite ends which mesh with similar teeth on the driven elements which are splined to the differential shafts or axle shafts. These driven elements are backed up by thrust bearings in the usual manner.

The tooth surfaces are warped or helicoidal surfaces, and the contact between the teeth is a surface contact, rather than a line contact as on a gear tooth, distributing the pressure over a great area, and reducing the unit pressure and wear. The movement between the teeth is a sliding movement. There are as many tooth contacts as there are teeth on the axle element, which in this case is 10.

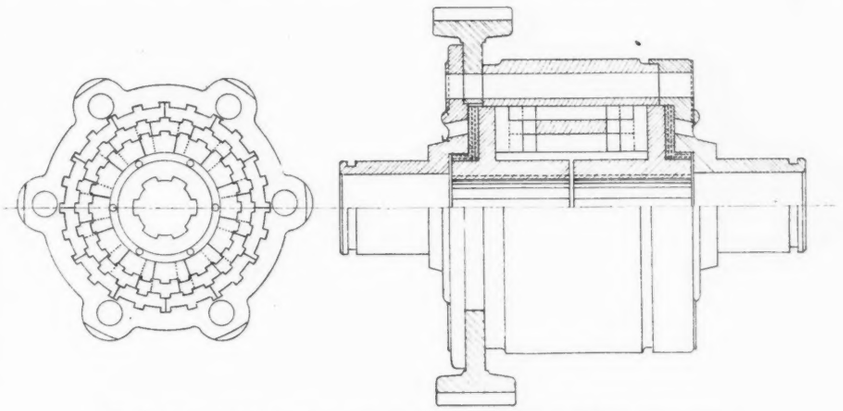
The actual area of contact for each tooth varies with the varying positions of the three driving rings. The least contact area is one-third of a tooth on one ring, which, in a ten-tooth arrangement, would give an equivalent total area of 3 1/3 full tooth areas for that ring, while the greatest possible tooth area is obtained when two rings are in position to share the drive, one ring having practically 1/3 tooth contact, and the other ring full tooth contact, giving with 10 teeth a contact of 13 1/3 teeth, which, of course, is duplicated on the other set of teeth of the opposite faces of the ring elements, except that when the one face has 13 1/3 tooth contacts, the other side has 6 2/3 tooth contacts. The sum of the tooth contacts on both sides of the driving rings varies from 20 to 10.

The top line of the tooth and the bottom or root line are both radii from the axis in parallel planes; also every element of the surface between the top and bottom lines of the tooth is a radius from the axis, in a plane parallel to every other element of the tooth surface. This gives a warped or helicoidal tooth surface.



Perspective view of the Patch differential and one of its driven members

In operation the casing and ring elements rotate as a unit, and when the vehicle is traveling in a straight line, provided both road wheels are of the same diameter, the axle elements will be driven also as a single unit with the rings and casing; but if one road wheel turns faster than the other, as in turning from a straight course, the axle element on one side is allowed to travel slower than the driving rings, and the other one faster than the driving rings, the rings moving axially as well as rotatively, the teeth on the rings working in and out of the teeth on the opposing axle elements, thereby allowing a differentiating movement between the axle elements.



End view, with casing end and one driven member removed, and longitudinal section

The locking effect is secured through the inability of one axle shaft, which has retained the greater percentage of traction, to convert its rotative motion through the angular tooth surface into an axial motion of the ring element, and from the axial movement of the ring, through another angular tooth surface, into rotative motion. That is, the driving rings cannot rotate the axle elements solely by their axial movements. A static resistance is offered by the weight of the road wheel and axle which serves as a lock, and this locking effect is added to by whatever traction may exist between the tire and the ground. In other words, the axle shaft cannot be turned by pressure parallel to its axis.

We have been furnished with the following particulars regarding working tests of the Patch differential: A differential was placed on a National car and run several thousand miles. The steel was not case-hardened; nevertheless, it showed very little wear after very severe usage, the car being put through all kinds of tests. Frequently one wheel was jacked up and the car allowed to pull itself off with one wheel; the front wheels were blocked with 6 x 8 timber, with traction on only one rear wheel; one front and one rear wheel were driven into loose sand in which the wheels sank to the hubs, and the car was stopped and backed or driven ahead from a standstill under these conditions.

It is claimed for this differential that it prevents spinning as long as one driving wheel has good traction, that it gives a positive and equal drive to both wheels as the car turns a corner, that it greatly reduces skidding and incidentally saves tire wear and fuel. The Patch differential is, of course, particularly applicable to trucks and tractors.

The Patch Differential Co. of Seattle has secured a license under the U. S. patents and the company's engineer is at present in New York City.

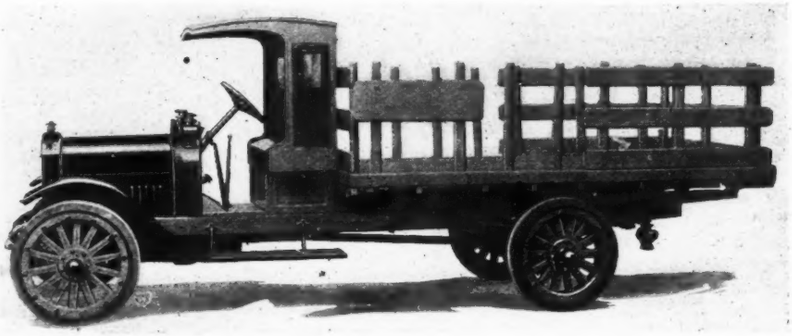
SIDE GUIDE & GRIPPER

Nelson Bros. Manufacture Jumbo Truck

Will Concentrate on 2½ Ton Model—Chassis Is Assembled from Standard Parts and Has Internal Gear Final Drive

THE Nelson Motor Truck Co. has just been organized in Saginaw, Mich., for the purpose of manufacturing a 2½-ton truck, which will be marketed under the trade name "Jumbo."

The plant formerly occupied by the Saginaw Motor Car Co., and before that by the Argo Electric Vehicle Co., will be used temporarily for the manufacture of these trucks. Slight alterations in the plant and the installation of some new machinery was all that was necessary to enable the truck company to start operations. Production began April 1 at the rate of one truck per day. This schedule will be gradually increased and preparations have been made to begin construction of a larger factory on twenty acres of adjacent property just secured by the company.



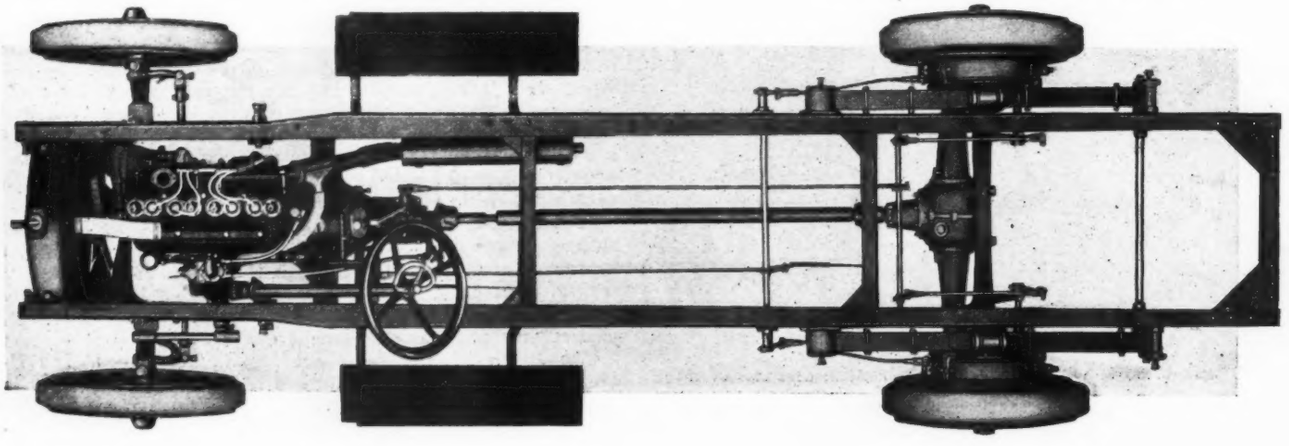
The Nelson Motor Truck Co. has a capitalization of $300,000, all paid in, and practically all of the stock is held by the Nelson Bros., who for several years have conducted in Saginaw a factory devoted to the manufacture of stationary engines and pump jacks. The organization which has been built up in this connection will also be used to market Jumbo trucks.

The officers and executives of the Nelson Motor Truck Co. are: President, H. B. Nelson; vice-president, C. A. Nelson; secretary-treasurer, C. J. Nelson; purchasing agent, C. A. Nelson; chief engineer, J. H. Hunt; factory manager, H. B. Nelson; sales manager, E. B. Sutton; advertising manager, C. J. Nelson.

A portion of the plant of the Nelson Bros. Engine Co. will be temporarily devoted to body production and painting work. The facilities of the two plants will permit of a production of five trucks a day, if necessary, before the new truck factory is completed.

It is planned to build only one size truck, a 2½-ton model, although future developments may lead to a change in policy. The truck will list at $2,250, the price covering a chassis with driver's seat, fenders, lamps, tools, and solid tire equipment. The bodies will be made to order in the Nelson factory. The truck is equipped with a Buda model H-U 28-hp. (S. A. E. rating) power plant and with internal gear rear drive. It has a wheelbase of 144 in. and a standard tread of 56 in. front, 59 in. rear. It is mounted on a pressed steel channel section frame of ¼-in. stock, the frame being 208 in. long, 34 in. wide, and 5¾ in. deep, with four cross members. The wheels require 35-in. by 6-in. solid, single type tires and are of Prudden manufacture, having fourteen square spokes 2½ by 2½ in. front and rear. The Buda power plant is a block four cylinder design, having a bore and stroke of 4¼ in. by 5½ in. It is an inclosed flywheel type with three-point suspension. The ignition is by fixed spark from an Eisemann G-4, high tension magneto. The carbureter is a Zenith and lubrication is provided by pressure feed to all bearings by means of a gear pump driven from the camshaft. Cooling is by centrifugal water pump and a zigzag tube G. & O. radiator having a cast iron base with removable core. The governor is a Duplex, driven from both motor and driveshaft, governing engine and vehicle speed independently, in accordance with Duplex governor practice. The fuel feed is by gravity from the tank under the seat, the tank capacity being 13½ gals. The drive is taken through a Fuller dry disk clutch lined with Raybestos. Transmission is by a Fuller selective sliding gear, having three speeds forward. The gears and shafts are made of 3½ per cent nickel steel and the entire box is fitted with ball bearings and is a part of a unit power plant.

Final drive is through a propeller shaft with two Universal joints to the Celfor internal gear drive rear axle. The gear ratio provided is 8 to 1 on direct. The front bearings are Timken rollers, while the bearings in the rear axle are Bower and Hyatt. The front axle is an I-beam type and is a drop-forged unit. Semi-elliptic springs are used, 40 in. by 2½ in. front, and 54 in. by 3 in. rear. Both brakes are on the rear wheels. The steering gear is a Jacox, fully adjustable.



Development of Parcel Car Design

Harley-Davidson Co. Decides to Make Only One Size, a 400-Lb. Machine

AFTER manufacturing a number of different designs of parcel car during the past few years the Harley-Davidson Motor Co., Milwaukee, Wis., has decided on a standard type of 400-lb. car. This design was found to best meet the requirements of flexibility, delivery radius, capacity and production. It is fully realized by the firm that there will always be a certain demand for commercial motor-driven vehicles of special design for special purposes. The appeal of the standardization idea was the most important factor in the decision to produce this 400-lb. parcel car.

To the casual observer it may seem that 400 lb. is a rather limited load capacity, but the selection of this size was not made until extensive tests with a 600-lb. model had shown that in regular work this was rarely loaded to its rated capacity and therefore meant a loss to the owner. Most conditions of the regular delivery service come within the capacity of the 400-lb. machine, and departures from regular service are mostly in the nature of emergency deliveries and messenger work. Most of the emergency deliveries are necessitated by thoughtlessness or negligence on the part of customers. For this emergency service the new machine is particularly fitted.

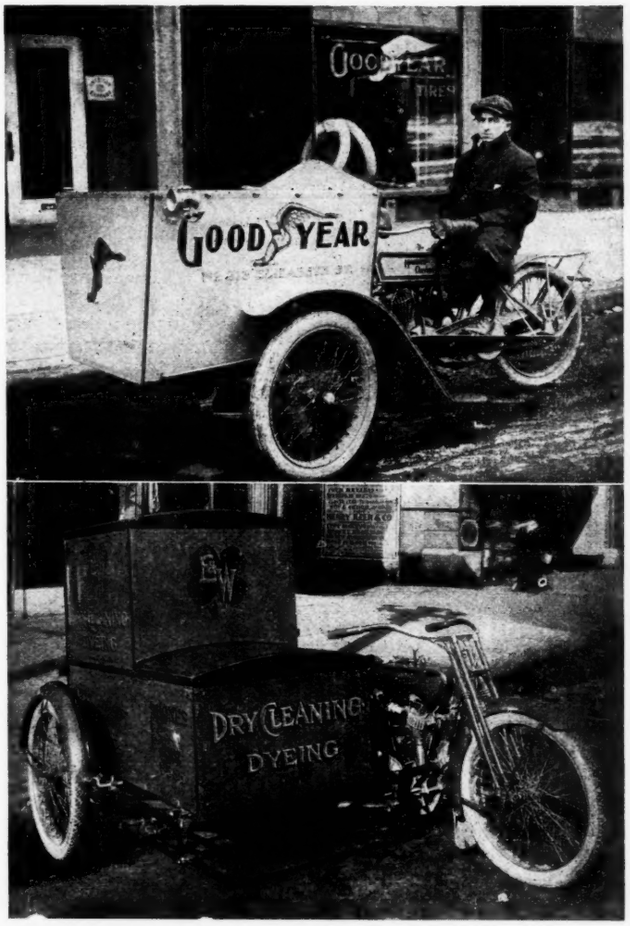
New Chassis Same as Used for Two-Passenger

The new 400-lb. parcel car chassis is exactly the same as used for the standard two-passenger side car unit of the Harley-Davidson company. The only difference between the side car engine equipment and the solo engine equipment is that a slightly lower compression is used in the side car engine. This uniformity greatly simplifies the production problem. The tread of the new commercial car is the standard 56 in., so that the machine can follow the regular wheel track on country roads. The drop axle affords a low center of gravity and insures ample road clearance. There are four springs, and they are so proportioned as to obviate the need for shock absorbers. The rear springs are scroll-shaped, while the front springs are quarter elliptic.

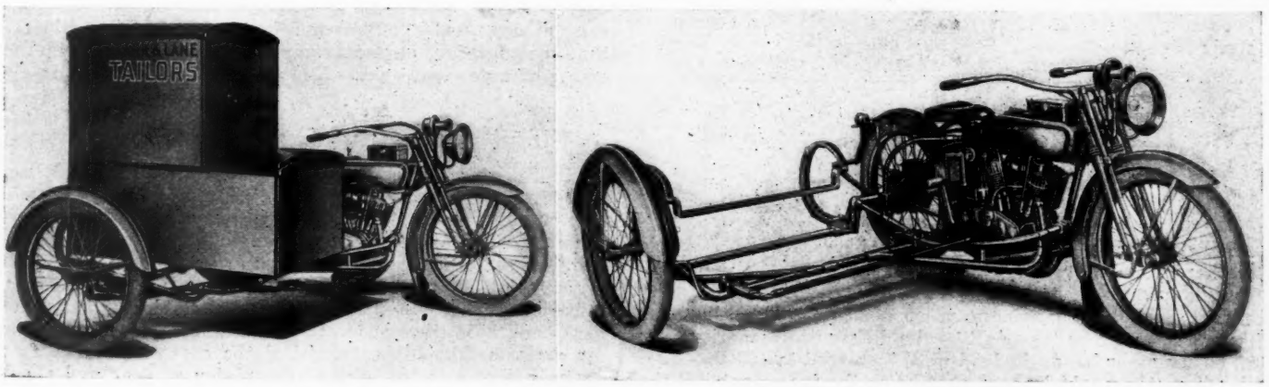
Undue rebound is prevented by two rebound snubbers, which permit of higher speed of the machine over rough roads.

The company's first venture into the commercial vehicle field was signalized by the appearance of the Harley-Davidson truck, with a rated capacity of 600 lb., which, however, was frequently exceeded in practice. This design was open to criticism because the central rear drive wheel made the machine a three-tracker and also because the van body overhung the front axle rather far, sometimes overbalancing the weight on the rear wheel. This truck is not being made any more, but it got into pretty fair production and is in daily use in a good many places where road conditions are favorable.

Experience has taught the Harley-Davidson company that road conditions must be taken into account in the design of a commercial vehicle. This led to the adoption of the two track side van and the placing of the side van so as not to interfere with the traction of the driving wheel.



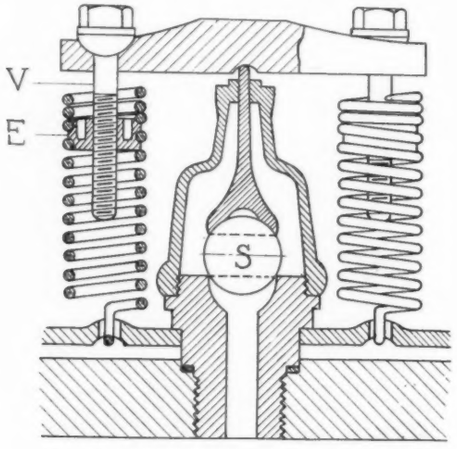
Top—The "truck" model of 600 lb. rated capacity now abandoned. Bottom—The 600-lb. side van which was discarded



The 400-lb. parcel car adopted for regular production, and its chassis

Improving the Technique of Hardness Measurements

IN the Brinell hardness test a steel ball is forced by a load or hydraulic pressure into the material under test, and the Brinell hardness number is the quotient of the load applied in kilograms divided by the spherical surface of the impression produced by the ball. To arrive at numerical values, either the depth of the impression, or the diameter of the impression is measured; the latter measurement is more convenient. In laboratory practice a steel ball of 10 mm. diameter is usually loaded with 3000 kg., and the measurement is taken after 5 min.; the practice varies, however. The test has been found very valuable in munition works; but 5 min. cannot be spared for a test which has to be repeated thousands of times in the course of a day. In French munition works 10 sec. are said to be allowed, and it is admitted that the measurements may then be incorrect by 8 per cent. The quicker the rate of putting on the load, the smaller will the observed impression be, since a hard material will continue to yield gradually. With varying rates of putting on the load, the Brinell numbers will hence fluctuate. The following figures as to the influence of the rate of applying the load were given by Mr. Guillery in a communication recently



Guillery's hardness test apparatus

presented to the Académie des Sciences (see *Comptes Rendus*, October 8, 1917). The columns indicate: A, rate of applying load, in kilograms per second; D, diameter of impression in millimeters; B H, Brinell hardness number; T S, tensile strength in kilograms per square millimeter; the intermediate columns indicate the errors, and the last column gives the percentage error; I refers to a soft steel, II to a semi-hard steel:

	A.	D.		B. H.		T. S.		Per Cent
I	0	4.74	0	159	0	55.6	0	0
	12.5	4.72	0.02	161	2	56.3	0.7	1.2
	25	4.70	0.04	163	4	57.0	1.4	2.4
	1500	4.60	0.14	171	8	59.8	4.2	7.1
II	0	4.094	0	212.5	0	74.3	0	0
	12.5	4.074	0.020	217	4.5	76.0	1.7	2.2
	25	4.059	0.35	221.5	9	77.7	3.3	4.3
	1500	3.975	0.118	227	14.5	79.4	5.4	7

Mr. Guillery obviates these errors by means of a simple mechanical contrivance which is based upon the following considerations. If the pressure were released immediately after reaching the maximum value of 3000 kg., the diameter measured would be too small by the differential quantity d D; if, on the other hand, the load were increased to (3000 + dP), the diameter would be too great. For the increment d P the error resulting from the insufficient duration of the pressure-effect can be compensated for in accordance with the relation: d P/3000 = 2 d D/D. In the case when the load was applied at the rate of 1500 kg. per second (fourth row of I), d D was 0.14, and hence: d P = 3000 × 2 × 0.14/4.74 = 177 kg.

To effect this compensation, that is to say, to regulate the maximum pressure automatically in accordance with the rate of charge, so as to be able to obtain correct results at a rapid rate, Mr. Guillery devised the apparatus illustrated in the annexed diagram. The pressure is applied by the aid of a hydraulic piston, the action of which is limited by the ball valve *S*. The lift of *S* is opposed by the spiral springs, which can be adjusted in two ways, first by the aid of the screws *V*, and secondly by the aid of the nuts *E* which on their outer circumferences are threaded to fit the convolutions of the spiral spring. The tension is altered by adjusting the screw *V*, and the position of *E*, which he turned up and down, adjusts the height of the spiral spring which is being utilized. By trial now the operator determines the impressions which, in the case of a certain steel, are normal for two rates of putting on the load, the rates varying in the ratio of 1 to 30; the device will then be adjusted also for any rate of applying the load intermediate between the limits adopted. Thus it will not matter whether the load is put on a little more or less rapidly than in the usual practice. The following figures show the accuracy which has been realized with the aid of this device; the upper row indicates the rate of applying the load, in kilograms per second, the lower row the corresponding diameter of the impression produced, in millimeters:

100	200	300	600	1000	1500	3000	kg.
4.38	4.37	4.40	4.39	4.40	4.39	4.39	mm.

The agreement looks satisfactory. Strictly speaking, a new adjustment should be made for every style of metal. It has been found, however, that the same adjustment will suffice for carbon steels and special steels, which have undergone some thermal treatment. Guillery gives the following diameter values in support of this statement; the first line indicates the rate of application of the load in kilograms per second, the last column referring to the standard Brinell test:

	12.5	100	600	3000	Standard
Soft steel	5.67	5.66	5.67	5.68	5.66
Semi-hard steel	4.40	4.36	4.36	4.36	4.36
Nickel-chrome steel	3.63	3.60	3.59	3.62	3.38
Same, reheated	2.61	2.62	2.62	2.63	2.60

Mr. Guillery states that the device has been working for several months without having failed on any occasion. With specimens of similar form, easy to handle, 600 tests can be performed per hour, 8 sec. of the 10 sec. of a test being required for the manipulations and 2 seconds for putting on the pressure. After a time, we should think, the spiral springs will need correction and renewal, and the question may be asked, whether the spring device, unless in itself a convenience, really offers sufficient advantage, considering that the engineer frequently has to reckon with experimental errors of a few per cent.—*Engineering.*

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Spiral Bevel Gears for Machinery Drives

IT is not always necessary to provide elaborate thrust bearings for spiral bevel gears in ordinary machinery drives, as fiber washers or hardened disks will often serve the purpose equally well. From a safety standpoint it is best to make all spiral bevel pinions so that the thrust comes back on the drive. Full information should be furnished to users of spiral bevel gears to enable them to assemble the gears correctly and hold them accurately in alignment. In every case the customer should be furnished the correct distance from the cone center to the back of the pinion or gear and should be cautioned to assemble them accordingly.

The Oil Burning Tractor Engine

Résumé of a Paper Presented by H. T. Sward, Sales Engineer of Fairbanks, Morse & Co., at the April Meeting of S. A. E. Midwest Section, with Discussion

MR. SWARD'S paper naturally divides into two parts, the first part dealing with problems encountered in the design of engines for operating on heavy fuels and the second part consisting of a description of a 2-cylinder horizontal opposed tractor engine, burning kerosene, which is evidently manufactured by the author's firm. There was nothing in the first part of the paper which is not generally known to automobile and tractor engineers.

The engine described in the paper is of the horizontal, 2-cylinder, 4-cycle type, the compression being carried at about 60 lb. per square inch. The cylinder, together with the crankcase, are cast in a single block, and the crankshaft is so arranged as to produce one power impulse for every revolution.

The fuel mixing chamber consists of a separate casting in which the fuel is kept at a constant level by means of an overflow pipe which returns the excess fuel delivered by a fuel pump to the tank in the base of the engine or tractor frame. The valves of both cylinders are directly beyond the throttle valve. All valves are in the cylinder heads, the exhaust valves being on the outside of the cylinder. This gives a minimum distance for the gases to travel and obviates condensation. Water circulation around the inlet valves and passages is restricted to insure a higher temperature of the water at this point.

Splash Lubrication Unsuitable

Experience has shown conclusively that splash lubrication cannot be used with heavy oils, such as kerosene and distillates, even with the best of construction. The present commercial grades of gasoline require the renewal of the crankcase oil at least every 1,000 miles, to insure against burnt-out bearings and troubles kindred thereto. Time is not distant when, for economy as well as satisfactory operation, this system must be abandoned, and force feed lubrication to all bearings adopted. Even to-day force feeed lubrication is almost universal on tractors, except those using automobile engines.

The cooling system of the engine is novel but has proven itself to be among the best systems used. The main frame of the tractor looks much like a steam boiler. This is a large radiator, with tubes, through which the air is drawn in direct proportion to the load on the engine. The exhaust from the engine is piped to the chamber in front of the radiator and discharged through a muffler shaped like a smoke stack, thus creating a draft through the radiator which keeps the water at a uniform temperature. Circulation is maintained by means of a circulating pump driven by belt from the engine flywheel.

The Dixie impulse starter type magneto is used for ignition, with suitable timing arrangements. In its selection service considerations played an important part.

The type of ignition is purely a matter of choice, but with engines operating at a speed from 400 to 600 r.p.m., we have found the high-tension system preferable, as it is difficult to get good operation with the make and break system due to the rapid motion of the reciprocating parts. The engine described in the foregoing is the result of years of experience in the stationary engine field.

In opening the discussion, the chairman of the meeting said that some of the tractor men would probably take issue with Mr. Sward on the possibility of carbureting kerosene. Dent Parrett said that in spite of statements made in the paper, there were some four-cylinder tractor engines which successfully burned kerosene.

A member who had some experience in using kerosene in tractor engines said that even when using cold air there was a loss in power of from 10 to 15 per cent when switching over from gasoline to kerosene, but the greatest trouble had been occasioned by the operator in the field switching from gasoline to kerosene before the engine was fully heated up. The main thing was to properly educate the operator. Mr. Farrington expressed the view that the reason no greater progress had been made in the development of kerosene engines was that so far internal combustion engine manufacturers had had all the business they wanted from the automobile and motor truck manufacturers and they had given little attention to the type of engine required by tractor builders. No gasoline engine would give good results on kerosene, even if fitted with the best kind of kerosene carbureter. Various changes in engine design were necessary to insure efficient operation on kerosene; one was to provide more water space around the cylinder heads and another to bring the cooling water close to the spark plugs. Recently the Beaver Mfg. Co. had developed an engine along these lines and had had very good results. Once the demand for automobile and truck engines subsided, engine builders would give more attention to the problem of tractor engines.

Mr. Arnold stated that in his opinion the burning of kerosene was not such a difficult problem as had been made out Many engines on the market to-day would start on less than 1 oz. of gasoline under ordinary atmospheric temperature conditions. Automobile type engines could be run successfully with care. As regards the use of water in internal combustion engines, Mr. Arnold said that he did not believe anybody knew just what happened. In his opinion, water was nothing more than a controlling agent, like a man driving a race horse. If water were drawn into the cylinders, the rate of heat liberation was altered. As far as cooling was concerned, less water was required to cool a kerosene engine than a gasoline engine.

Life of Tractor Engines

There was considerable discussion regarding the life of tractor engines, and the point was made that this varied widely according to conditions. Mr. Clark said that engines some times would be worn out in a few days, but that this was always due to getting dust and dirt into the cylinders. Some engines meet the very hardest kind of service to a very satisfactory degree. Apparently it does not make any difference how many cylinders a tractor has, as far as its life is concerned. In speaking of the life of an engine, it must be remembered that in some localities tractor engines are operated only about 25 days a year, while in other places they are used half the year.

One speaker stated that there was a feeling among the farmers that the average tractor was not sufficiently reliable, and the impression was conveyed that the average life was only one year. This was refuted by another speaker, who said that he had operated a tractor for 3 years, and that his repairs at present amounted to only about $75 per year. One reason for the short life of some tractors was that they were absolutely neglected by the owners, and the chairman said that he had seen tractors standing out in the field in winter without any other covering than 5 ft. of snow. If given proper care, tractors will show as satisfactory a life as any other type of machinery. This statement was confirmed by Mr. Farrington, who said that in his experience motor trucks ran from 25,000 miles all the way up to 300,000 miles, depending upon the service, care and attention given them.

Layout of a Modern Conveying Plant

Three Systems Installed in Harroun Factory Typify Latest Practice in Gravity, Overhead and Chain Methods

IN LAYING out a conveyor system, the one basic thought behind the installation should be that the work must be kept in continuous motion. The fundamental ideal behind a conveyor system is that it is designed to meet the needs of progressive manufacture or assembly. By its use the manual shifting of the work is avoided and the timing of the rate of progress is in accordance with the ability to complete successive steps in manufacture or assembly. To be ideal the steps along the route of the conveyor system must be equidistant and so timed that the chassis enters into the next phase, or set of operations, immediately after the preceding phase has been completed.

The chain method for chassis assembly has given eminent satisfaction. It has not been found available, however, for the manufacturing steps, and it will be of interest therefore to note how one of the newest quantity production concerns has handled in a modern way the entire conveyor problem.

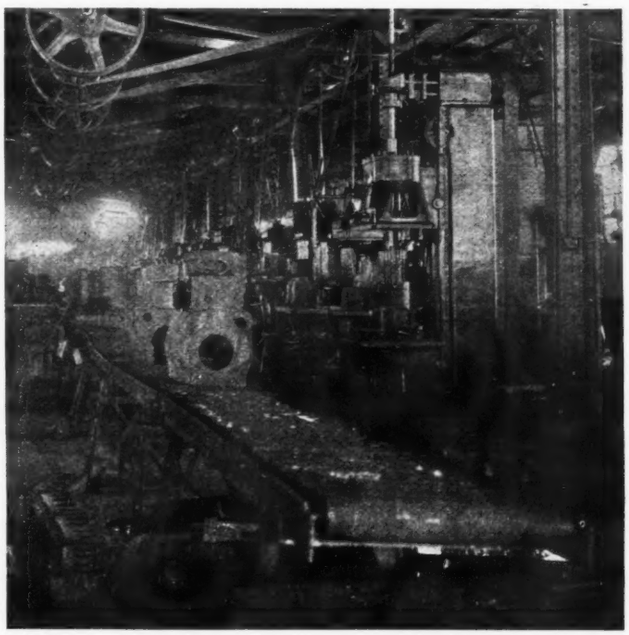
In laying out the conveyor systems at the Harroun factory at Wayne, Mich., three basic methods were employed to meet the peculiar demand of the three types of manufacturing and assembly work to be undertaken.

There is, first, a gravity conveyor for taking the heavy castings for the cylinder block from machine to machine while the operations are being completed upon it.

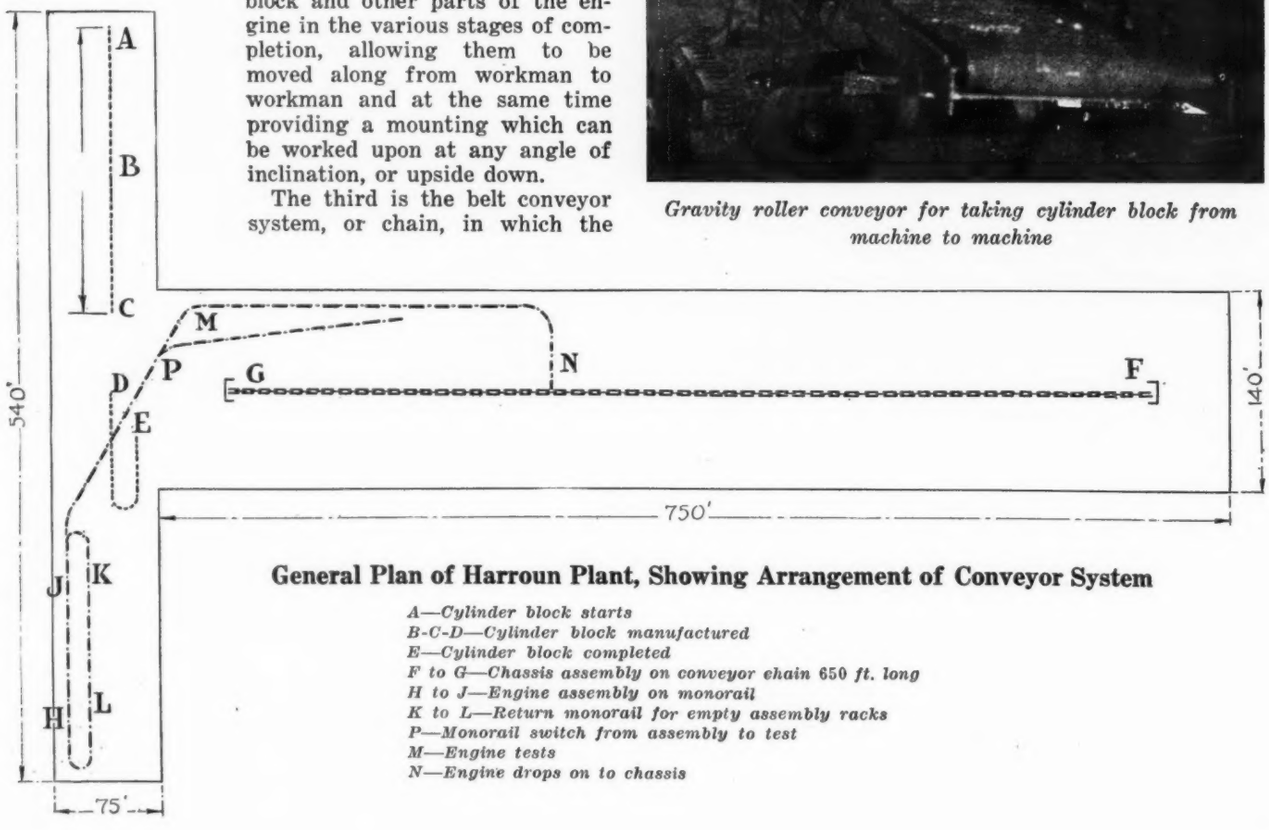
Then, second, is the overhead conveyor which takes the cylinder block and other parts of the engine in the various stages of completion, allowing them to be moved along from workman to workman and at the same time providing a mounting which can be worked upon at any angle of inclination, or upside down.

The third is the belt conveyor system, or chain, in which the chassis moves from the time at which it is only composed of the frame structural members until it becomes a completed car.

The layout of the Harroun plant is in the shape of a large T. The top of the T is the machine or manufacturing department, and the long stem of the T is the assembling department. In the machine and manufacturing departments are located the gravity and overhead conveyor systems for engine manufacture. In the long assembling department is the chain.

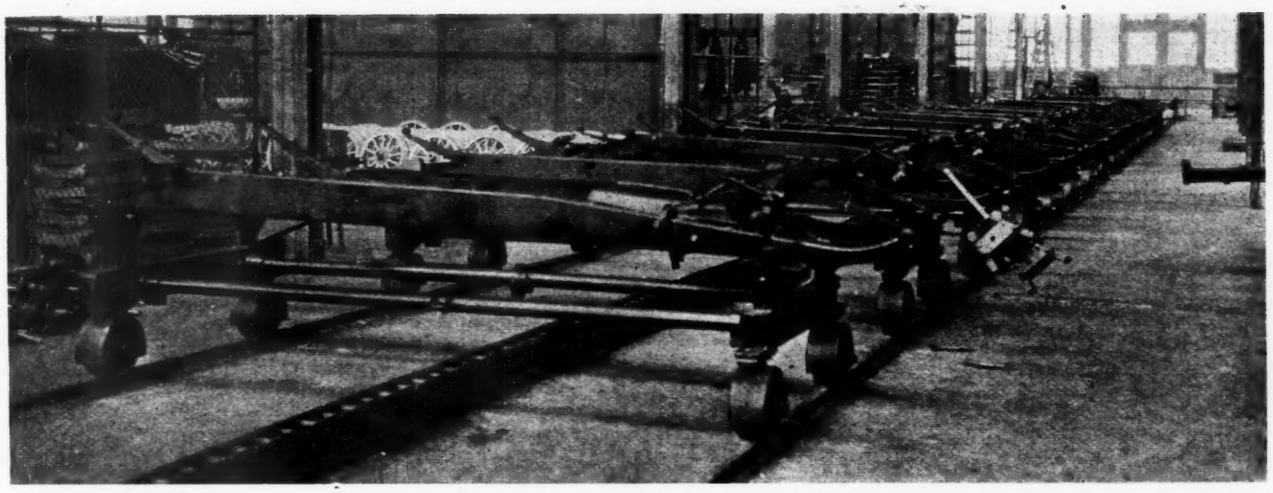


Gravity roller conveyor for taking cylinder block from machine to machine

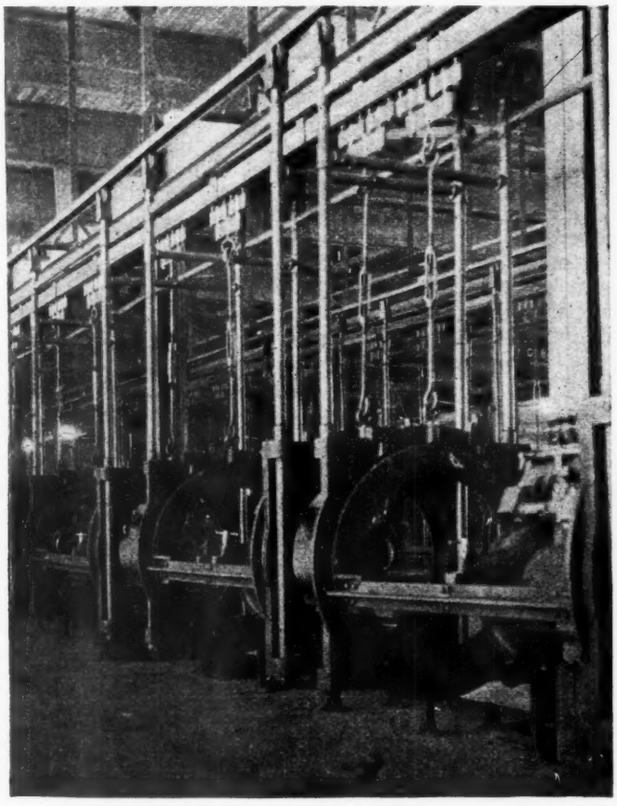


General Plan of Harroun Plant, Showing Arrangement of Conveyor System

A—Cylinder block starts
B-C-D—Cylinder block manufactured
E—Cylinder block completed
F to G—Chassis assembly on conveyor chain 650 ft. long
H to J—Engine assembly on monorail
K to L—Return monorail for empty assembly racks
P—Monorail switch from assembly to test
M—Engine tests
N—Engine drops on to chassis



Chain system with carriers having incompleted chassis in position, showing how the carriers operate upon track running parallel with the chain



Overhead mono-head type of conveyor with flexible rack for mounting motor in any desirable position in assembly

By the use of these various types of conveyors a true progressive system of both manufacture and assembly can be carried out with the least possible loss of time. The map of the plant illustrates the layout of these three conveyor methods. The other illustrations herewith show the processes undertaken by these various conveyor systems and give an idea how manual handling is reduced by their use.

Since the highest ideal of any conveyor system is to keep the work continuously in motion with a minimum of manual handling, it is natural that the three systems should overlap each other sufficiently to give continuity to the various manufacturing and assembly processes.

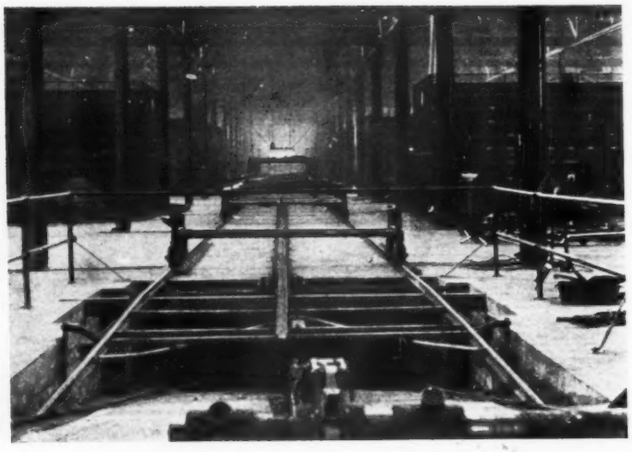
The map of the plant shows how the engine manufacturing and assembling takes place in the 540-ft. machine shop, while chassis assembly takes place in the 750-ft. saw-tooth building which forms the stem of the T. This brings out the fact that continuous motion has been borne in mind in the Harroun installation. The overhead monorail conveyor system carries the engines when they are completely assembled to the test room, and from there directly to the point on the chassis assembly chain system where they are to be dropped upon the chassis. The gravity conveyor system handles it at a point where the engines can be conveniently placed upon the assembly stand, which itself is carried by the monorail conveyor.

Start of Operations

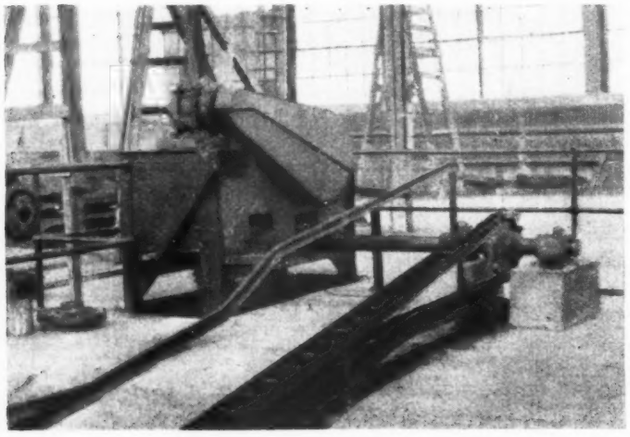
The raw castings for the cylinder block, after going through the preliminary steps of having their flanges and flat faces milled off to the desired dimensions, are moved by the gravity conveyor from machine to machine for drilling, boring, reaming, tapping and other manufacturing steps. The machines are arranged progressively on both sides of the gravity conveyor tables, and the tables of the machines are the same height above the ground as the gravity conveyor. The inclination of the conveyor is slight, being just sufficient to allow the cylinder blocks to be moved along readily between the gallery of machines.

When the machine operations are completed, the cylinder block is carried to the assembly rack, which is carried by the overhead monorail system. These assembly racks are fitted with a rotating member in which the engine supports are contained, so that they not only form a conveyor system but a convenient work rest, allowing the engine to be turned over to any convenient angle. The racks are moved along on an endless track system which allows the racks to be brought back to the point at which they started after having discharged a completed engine on the chassis.

While the sub-assembly work has been going on in the machine shop and in other departments, the chassis has been started along the way down the 650-ft. conveyor chain which runs along the center of the 750-ft. building. The conveyor chain with carriers and chassis frames in their initial stages starts in the far end of the building, which would form the base of the T, and works up toward the point at which the engine is dropped in place and



A tunnel beneath the floor brings back the carriers to the starting point of the assembling chain. In this view the exit from the tunnel is shown



This shows the conveyor chain which runs beneath the floor and brings back the empty chassis carrier

along to the upper part of the stem of the T, until the chassis reaches completion, at which point it is run off the track for test.

The speed of this conveyor chain averages about 21 ft. an hour. The limit of capacity of the chain is the number of chassis which can be put on it, side by side, running along at this particular speed. As the chassis are approximately 60 in. wide, 130 of them can be placed along a chain at a time. Or, to put it another way, if the chain is traveling at the rate of 26 ft. an hour and there is a chassis every 5 ft., a little better than five an hour will be dropped off. As the chain can be operated faster, the capacity of a chain of this length will be anywhere from fifty to eighty a day. It is stated that it is feasible to run up to a capacity of one every 7 minutes on this particular layout. The variable factors in an installation of this kind are the number of men working along the chain, which would, in turn, govern the speed at which the chain could be successfully operated, so that the men on the different operations could keep up with the chain speed.

The conclusions which may be drawn from the Harroun installations, regarding the use of the three types of systems, are applicable to any factory doing manufacturing work on parts which are heavy to handle and which then must assemble these units individually and afterward as part of larger units. In work involving heavy castings, such as used in engine manufacture, the gravity conveyor system works out well because it is nothing more than a table allowing the parts to be readily moved from the conveyor to the table of the machine. The preliminary operations are always milling, drilling, boring, reaming, tapping, etc., being of such a nature that the work is moved from the conveyor table into the jig and then out again to other machines before manufacturing is complete.

In the assembly and sub-assembly work on these heavy castings it is particularly desirable that the conveyor not only carry the part along on its way, but also permit of working at various angles, or upside down. This is handled nicely by the monorail system with the rotating engine stand which hangs from the monorail.

The three classifications of continuous assembly of large objects, such as chassis, would naturally have to be handled by some such system as the chain, which allows the chassis to be hooked upon it and carried along. None of the construction work on these systems is of such a nature that large alterations are called for in the plant. Perhaps the chain system, which necessitates a return tunnel, is the most involved in this direction. The construction of the gravity conveyor is simple and well known, being simply composed of a framework comprised of side members supporting pivoted axles, about which rollers revolve.

Conveyor on Tubular Track

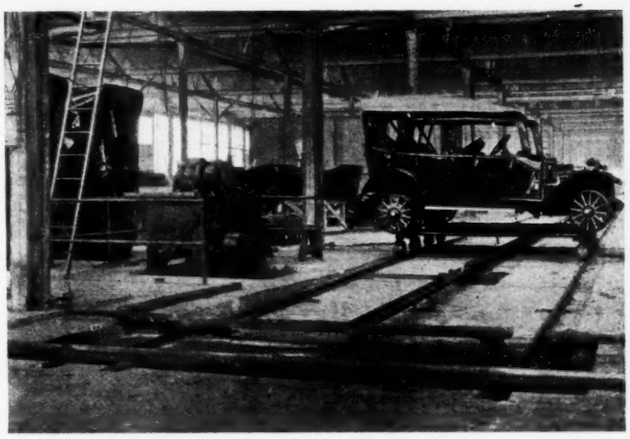
The conveyor chain operates on a wide track of tubular construction of correct dimensions to support the chassis frame at proper points. The chassis frame is first placed upon the carrier in an upside down position and a hook dropped down into the chain, allowing it to pull the carrier along at the proper rate. The tunnel beneath the upper chain is illustrated very clearly. This is at the starting end. An empty carrier is shown here ready to start its journey along the track with a new chassis frame mounted upon it. The empty carriers come up from the tunnel below and are switched back over on to the upper chain above the surface of the floor. An illustration shows the under chain, the one which passes beneath the floor, and which carries back the empty carriers. The motor to the left is the one which drives the chain. The chain case of the motor designed to give the proper speed or reduction between the independent electric motor and the axle of the chain is shown.

The switch-back mechanism for the upper chain is also illustrated herewith. This is the end at which the chassis starts, and, as will be noted, the underneath chain is driven from this end, while the overhead chain or upper chain is driven from the finishing end. This finishing end is also shown. The motor for driving the upper

A close-up view of the switch-back or end pulley of the chain which is above the floor. This is the chain which pulls the carriers together with the chassis along the assembly floor

chain is seen at the left side of the drawing and can be recognized by the chain case, which is similar in shape to the chain case shown at the end of the conveyor system. The completed cars are dropped off the carrier just before the carriers reach the end of the conveyor system, and then the empty conveyor is rolled as far as the elevator, which descends with it and places it in correct position to be carried back to the starting point of the assembly chain. A photograph shows the completed car which only has to receive its tires, which are mounted in another location on the rim, before being rolled off the carrier to the platform.

This conveyor chain tracks down the center of the floor, instead of to one side, which enables the various stockrooms carrying parts and accessories to be so located that the amount of manual carrying of these parts is reduced to the lowest limits. That is, the stockroom is placed in such a position along the travel of the chain that the parts can come from it directly to the chain and be at the proper point for immediate placing upon the chassis.



Completed cars nearing the end of the assembling chain. At the end of the chain there is a space along which the carrier is rolled to the elevator in the foreground

Foreign Trade Development

(*Continued from page* 908)

of the community for raw material, machinery, tools, clothing, luxuries, etc., the latter depending greatly upon the degree of refinement of the population. Naturally, those people who can be compared with us in civilization, regardless of their geographical location, will be interested in buying commodities which we ourselves use and enjoy, such as automobiles, victrolas, pianolas, motor boats, photographic apparatus, etc.

On the other hand, the peoples in savage and semi-savage countries may use cheap cotton cloth and a few simple utensils, but would hardly create a market for laundry machinery, much as they might need it.

Knowledge of these conditions, based on study and observation, is the only way to ascertain whether there is a market for a product. It is an interesting and fascinating study, and well worth the time of any business man who desires to expand the horizon from which he secures orders.

Moreover, in going into new markets, it is well to familiarize one's self as far as possible with the commercial laws effective in those countries. Because we have certain laws for doing business in our country is no indication that the same applies elsewhere. While the laws in approximately fifty independent foreign countries may differ, not to mention the colonies which may come under their jurisdiction, having their own local regulations, and while, at a glance, the complexity of this subject might appear discouraging, yet it is not hopeless.

Commercial law governing foreign transactions contains a degree of uniformity in fundamental principles throughout the world. Then, again, there is a certain amount of trust, confidence and business honor existent when one's negotiations are carried on with reputable people, regardless of where they are located. A firm wishing to maintain its reputation and credit will find it obligatory to follow established business practices, rather than stoop to acts of cupidity. Commercial law has been largely built up by a long line of precedents, previously established by merchants in their dealings.

There are two distinct legal groups involving civilized nations. The first includes the United States, England and some of her colonies, whose law has not been reduced to fundamental codes, legislation coming under the head of common law, and is based on decisions of the courts and precedents.

The second group includes practically all other nations, and is using what is called civil law, which is closely related to the old Roman law. The underlying principles of this civil law are frequently embodied in the form of written codes. What interests us most in civil law countries is the section covering commercial codes, which makes quite a distinction between traders and commercial transactions and non-traders and non-commercial transactions.

Therefore, in drawing up agency contracts, in shipping goods on limited or indefinite consignment, in allowing expenditures to be made for propaganda, and in dealing with trade mark and patent matters, in sending salesmen to work independently of any established agencies, and in extending credits, it is advisable to become familiar with the legal points covering each in the countries concerned.

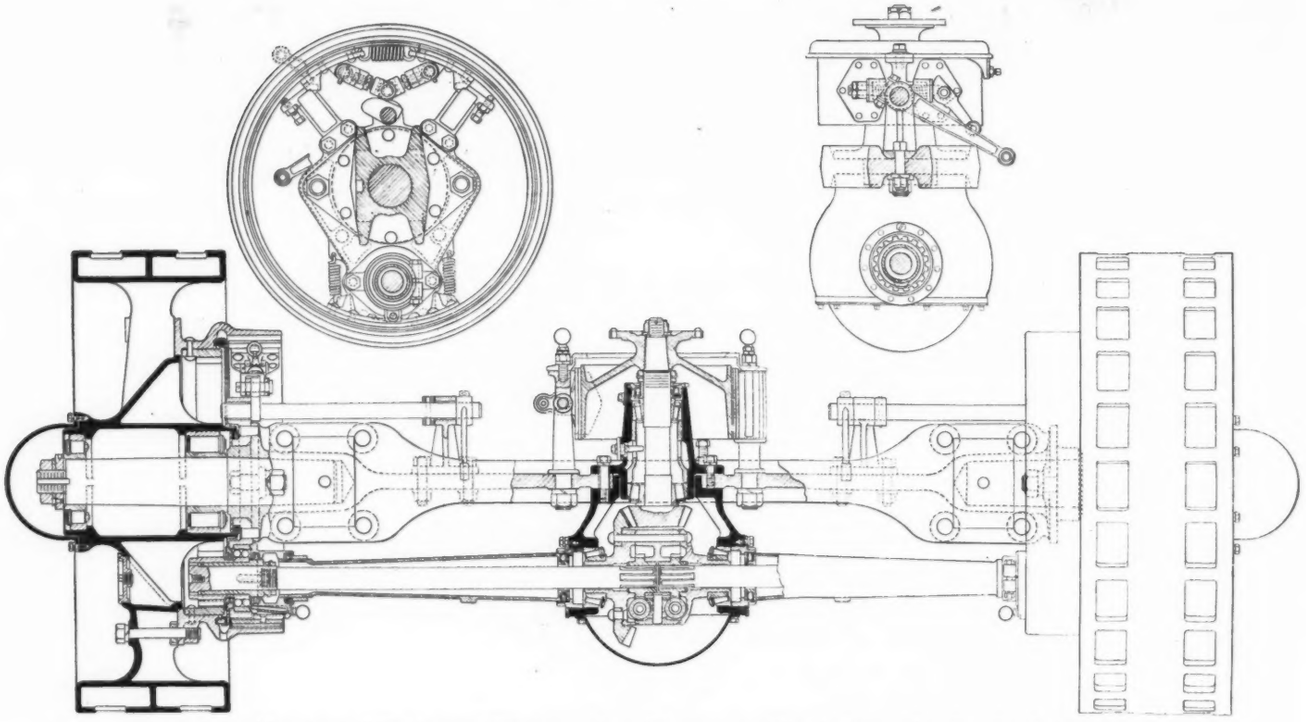
The matter of regulating the selling price of your products in foreign countries deserves the most profound consideration. The fact must not be overlooked that the foreign salesman, or dealer, is in a large percentage of the cases up against more competition than would be the case here in America.

It is obvious, in view of the additional cost of transportation, duties, etc., on shipments from America, that foreign dealers, thinking only of their own pocketbooks, might easily and wilfully quote prohibitive prices on American products in order to sidetrack them, and thereby be able to handle a similar article of European production on a much more profitable basis by bringing the price up sufficiently under the American to secure the business. This increase in price and the low cost of delivery of the European article would naturally make his margin of profit most acceptable. It therefore behooves us all to give this matter special attention, and the best place to secure the data is on the ground.

This brings me to one of my hobbies, namely: If you want foreign business, go after it in person. Take the time. Become personally familiar with the markets and the agents who are handling your interests. How can any dealer enthuse over principals whom he has never met, and with whom he has never had the slightest degree of social intercourse? Insurance agents write millions of dollars' worth of insurance on the strength of their personal acquaintance, often on an unequal basis with their competitors, but the personal contact and bonds of friendship get them the business. The same applies to the development of foreign trade from the standpoint of the individual firm which is expanding into this field.

Torbensen Producing 3½-Ton Axle

Follows Firm's Usual Practice, but Has Propeller Shaft Brake in Addition to Rear Wheel Brakes



Assembly view of Torbensen 3½-ton axle, with cross-sectional views showing brake details

THE Torbensen Axle Co., Cleveland, Ohio, is now in production on its 3½-ton internal drive rear axle. The 5-ton unit is not as yet in production, but a sample job has been made up and it is being submitted to test by an eastern truck manufacturer. The 3½-ton axle carries out the fundamental principle back of the design of the Torbensen products of lighter capacity and has additional features, particularly in the form of a propeller shaft brake mounted on the drive pinion shaft.

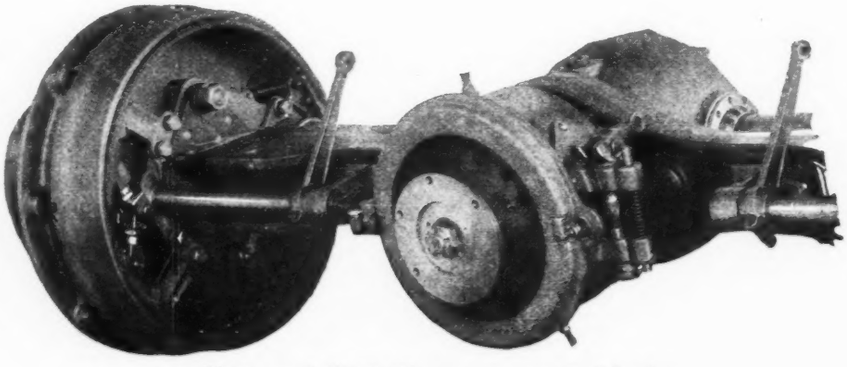
The axle is designed to carry a maximum of 13,000 lb. on the spring pads. From a transmission standpoint, it has a capacity of 40 hp. as calculated by the Denby-Marshal formula. The axle has a reduction ratio of 10.2 to 1, a thread width of 67.5 in., and a spring center distance of 42 to 44 in. with 4-in. springs.

As is usual in Torbensen construction, the load carrying functions of the axle are taken care of by an I-beam forging which supports the entire structure. This forging has a boss in the center which is pierced to allow the mounting of the transmission members. In the case of the 3½-ton axle, the differential housing is bolted to the I-beam in a circle around the hole in the I-beam, and the rear end of the propeller shaft bolts against a flange on the pinion shaft which supports, by means of a taper connection, the brake drum. This brake assembly is mounted forward of the I-beam and the differential assembly, and the live axle is behind the I-beam forging.

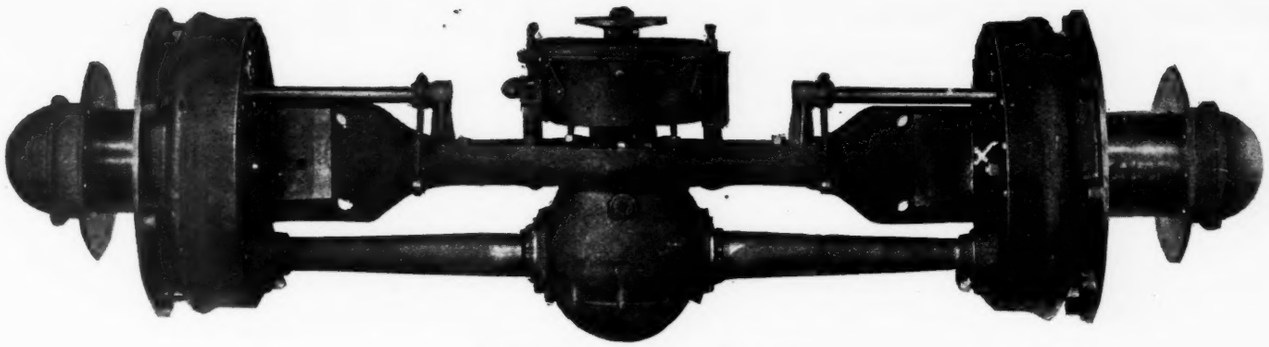
The drive is transmitted through the pinion shaft brake flange by means of a bolted connection through six 25/64-in. holes, equally spaced. The pinion shaft is carried on two sets of roller bearings.

The propeller shaft brake, mounted on the front end of the pinion shaft, has a diameter of 10 in. It is a contracting type with the operating mechanism supported by two brackets bolted to the axle forging. The linkage for operating the brake is connected with a cam lever, as shown in the photograph herewith, this lever serving as a contracting means for engaging the brake.

The live axle is contained in two drawn steel tubes which



Photograph illustrating arrangement of brakes



Photograph of the complete axle

bolt against the differential housing, carrying the internal drive pinion in accordance with usual Torbensen practice. The differential is an M. & S. The differential ends of the driveshafts are carried on Bock roller bearings and the exterior, or wheel, ends are carried on a double row of S. K. F. No. 1310 annular ball bearings. The axle shaft diameter is 1 5/16 and the axle spindle diameter is 3 3/16 in. The brakes on the wheel hubs are 19 in. in diameter, and are internal expanding, being actuated by a cam and toggle arrangement in which the action of the cam expands the toggle, in turn expanding the shoes against the internal face of the drum.

The axle is adapted for either steel or wood wheels. The spokes of the steel wheels are 3½ in. wide, and those of the wood wheels, 3 in.

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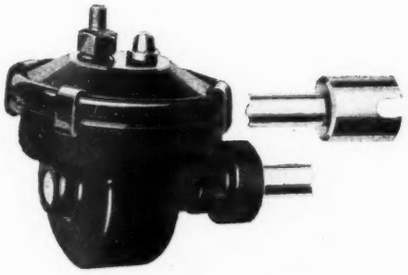
Model G Taylor Crankshaft Pump

A NEW design of engine-driven tire pump has been placed on the market by the Taylor Mfg. Co., Redford, Mich. This is a refinement and reduction of the present model Taylor crankshaft pump, which has been on the market for a number of years. It is practically of the same capacity,



Taylor crankshaft pump

drives from the end of the crankshaft and is held in position by a bearing at the crank handle hole, in addition to which it is supported by a spring grip which fastens to the cross member of the frame. The new model G pump will sell at $7.15 east of the Rocky Mountains and $7.65 west of the Rocky Mountains. It will be distributed through large jobbing houses.

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The Gilson-Firestone Carbureter

A CARBURETER that will burn gasoline, kerosene, distillate or alcohol with equal facility and without change of adjustment is now being made by the Gilson-Firestone Carburetor Co., Chicago. The company really manufactures three different styles of carbureter, the No. 1, which is intended to operate on kerosene after starting on gasoline; the No. 2, for vaporizing half-and-half mixtures of gasoline and kerosene, and the No. 3, for burning gasoline only.

These carbureters are especially suited to Ford, Maxwell, Chevrolet, Grant and Saxon cars. The models for burning kerosene are constructed of copper to better hold the heat which is brought down to the mixing bowl by a pipe tapped into the exhaust manifold. The fuel pin is also heated by this same means. There are but two moving parts to the whole carbureter, and the needle valve is the only possible adjustment.

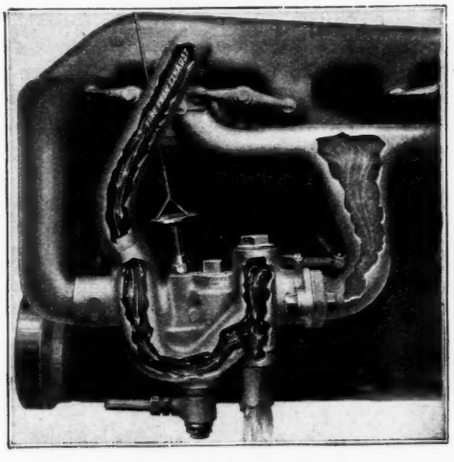
In operation, the car is started on gasoline until the exhaust gas gets a chance to warm up the fuel pin; then the fuel is changed to kerosene by means of a three-way valve. This method of heating keeps the fuel pin at about 450 deg. Fahr. The gasoline is carried in a 1-gal. auxiliary tank which is supplied as part of the equipment. The three-way valve can be controlled from the dash by an extension rod.

The results claimed are a dry mixture, no dilution of lubricant, no carbon, more power, more speed and more mileage. When using models which vaporize kerosene, as much if not more mileage is claimed than from an equal quantity of gasoline. This of course results in economy in cost of fuel. On the models using diluted gasoline or straight gasoline, a sufficient economy is claimed to make the device a paying investment.

A choker is provided which operates in the usual way by cutting off the air and drawing a greater amount of raw gasoline through the jet. This choker is for use in cold weather.

In recent tests with the carbureter applied to a Ford car, run over Chicago streets, the following results were obtained: Burning straight gasoline, 23 miles per gal.; burning kerosene, 25½ miles per gal.; burning distillate, 26 miles per gal.; burning alcohol, 23 miles per gal.

Outfit No. 1 (for kerosene) includes a three-way valve with extension dash rod, a 1-gal. tank for gasoline with copper tubing and a water circulating pump and is sold for $30 with a $5 allowance for the old carbureter. Outfit No. 2 (for half gasoline and half kerosene) is $22.50 and includes a three-way valve with dash extension rod and 1-gal. auxiliary gasoline tank with tubing. Outfit No. 3 (for gasoline only) is the same as No. 2 without the extra tank, dash rod and valves.



Gilson kerosene carbureter

AUTOMOTIVE INDUSTRIES
The Automobile

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War Models

IN England during the early stages of the war there was much talk of post-war models of passenger cars. The manufacture of passenger vehicles to other than government order was absolutely prohibited, as the resources of the automobile industry were required for the production of aircraft engines, trucks, munitions, etc. In the United States entirely different conditions with respect to fuel and transportation insure the continuance of the passenger car industry, though under restrictions on volume of output. In view of these restrictions there is little chance that much development work in passenger cars will be done while the war lasts, as in most lines the demand for cars exceeds the supply and there is no incentive to make expensive changes. However, the imperative need for economy will influence some firms to bring out models which are less expensive to manufacture and to operate than those they have been turning out heretofore. Greater compactness generally, with a shorter wheelbase and less piston displacement, will characterize these models. Of course, an economy model will have not more than four cylinders, as the chief claim for a greater cylinder number is more luxurious riding.

Size of Farm Tractors

NOW that tractor development is in full swing a most interesting question to those engaged in the work is that regarding the sizes of tractor that will be most in demand among farmers. Most of the early tractors were very heavy and comparatively powerful machines. They were intended for the very large farms in some of the Western States, the plowed acreage of which runs into thousands of acres. This was, no doubt, a logical beginning, because the greater the capacity of a plowing tractor the more economically it can be operated, provided there is work enough for it to do.

It was soon found, however, that the available number of customers for such large tractors was rather small. The great majority of the farms in the Middle West are quarter sections, and as we proceed East the farms have been split up further and many are too small for a motor tractor as now made. There has been an inclination of late to take care of these miniature farms by the production of single plow two-wheel tractors which the operator controls from the ground.

In any particular case the best size of tractor, of course, is that which does the work required at the lowest cost, everything considered. The items of expense include drivers' wages, fuel and oil, interest on investment, depreciation and repairs. It is obvious that within reasonable limits the item of drivers' wages decreases as the size of the tractor increases, because with a larger tractor the work can be done in less time. It is not likely that the items of repairs, fuel and oil (per acre plowed) are affected much by the size of the tractor, but the interest on the investment increases with the size and the depreciation probably is also somewhat greater in the case of the larger tractor, because depreciation is dependent not alone on the work done but also on the lapse of time, and the time element in depreciation is especially important in the case of machinery in a state of rapid development like the farm tractor. Therefore, a larger tractor, generally speaking, will reduce the labor cost, whereas a smaller tractor will reduce the interest on investment and the depreciation account.

To the farmer the problem presents itself in a somewhat different light, however. Farm help, as a rule, is not hired by the day or week, but by the month or year, and the outlay for labor cannot be closely adjusted to the amount of work to be done. Therefore, the question confronting a farmer in selecting a tractor is whether a certain size will enable him to do his work in the limited time available. With a larger tractor he might do the work in less time, but inasmuch as he has to keep his help in any case there is no direct cash gain to him. This, of course, is only one of the factors affecting the question, as farm tractors are used for many purposes besides plowing. But the underlying principle that an increase in the size of tractor reduces the labor cost still remains and may well put an end to the present tendency to divide up farms into smaller parcels.

Investigate Aircraft Situation

By David Beecroft

WHEN Gutzon Borglum, the New York sculptor, has through various channels got too many of our Washington people and perhaps millions of the public to imagine that he was specially commissioned by the President to report on the aviation situation, and it has suddenly been disclosed that he was never so commissioned, it is high time that we have a careful investigation to give to the public those facts they are entitled to, without giving out any information that will help the Hun cause.

When the Aeronautical Society of America, which seems to be primarily bent on publicity for the benefit of some of its members, gains the ears of congressmen and senators with its glaring generalities, it is high time to have a real investigation and get at the truth of the situation so that these many reports, some of which appear to be stimulated by selfish interests, are consigned to that quarter of oblivion best suited to their case.

When criminal charges against members of the Aircraft Production Board are filling the air we owe it to those men, who last year were willing to shoulder the load in the face of lack of power, to let the public know where the money has been spent and to produce the facts as to graft and profiteering, both of which have been hinted at and insinuated.

There are hosts of facts that should have been told last July and last August and last September that have been buried under bushels, and it has been the hiding of these facts that has made it possible for so-called investigators to gain wide attention for their alleged reports.

The stupidest rumors have been credited by men in the service who should have known better, but their knowledge of aircraft is so limited that they have not yet learned, or even gained a chaotic conception, of the volumes they do not know.

A Senate investigation will reveal scores of facts that will stand to the credit of those who have handled the job up to the present.

There will be many criticisms against these same persons, but as we have already read and re-read so many of those criticisms, it will be refreshing to get, through official channels, some of the good that these same so-called profiteers have accomplished. They have been accused of misappropriation of public funds. They have been accused of giving to the nation false information. The accusations have embraced so much as to include almost everything except pro-German acts.

Let us have the truth and tell it. Keep under cover those secrets that we would like to keep out of German hands and heads.

Our aviation policy has not been sufficiently comprehensive.

It has been too much concentrated.

We have practically concentrated on one type of training plane and two designs of engines for fighting and war zone work. This has not been broad enough, if we can correctly interpret the immeasurably broader activities in the development of engines in Europe.

Quantity production must be had and our policy for this end seems to have been sanely and broadly laid out; but there is a tremendous amount of development and research work that must be done.

The development of aviation engines for all war needs is a job for a corps of a dozen or a score of our greatest engineers. If this war is to be won through the air, then let us put on the job a force adequate to the end in view.

Perhaps one-half of such an engineering corps should be located in France where the daily report of the airplane can be had and where not a needless hour is lost in getting the latest information and passing upon it.

In addition such an engineering corps in Frace could be backed up with a laboratory adequate to its needs. It could pass on a volume of development and have a special ocean mail service to get the facts to the correct persons in America.

□ Latest News of the

$2,000,000 Earnings For Curtiss

Expected That Balance Will Show Profits of Nearly $10 a Share

BUFFALO, N. Y., May 8—The Curtiss Aeroplane & Motors Corp., which has been constructing considerable quantities of training planes and has recently finished one order for 1400 is understood to have earned a net of upward of $2,000,000 after preferred dividends. This equals nearly $10 a share on the $217,000 of common outstanding.

It is expected that the annual report will show that the company is now doing business at the rate of $5,000,000 a month, which compares with less than $2,000,000 average for 1917 and about $700,000 for 1916. Production should be brought up to nearly $10,000,000 monthly before the end of the current year. Although the balance sheet will probably show a net of $2,000,000, the amount carried for profit and loss surplus will not be much in excess of $700,000. Over $1,000,000 in patent valuations has been written off out of earnings.

In addition to training planes, the company has also been producing flying boats during the past two years. During the last 12 months the company has been building these for the British government, the first order being for 50 and this being immediately followed by another for 100 additional. Twenty-two flying boats went out in a single order last week. The company is also turning out at the present time a Bristol type of fighting plane. The Curtiss payroll probably includes more than 13,000 employees.

—

Motor Truck Situation Unchanged

WASHINGTON, May 8—The military trucks situation remains about the same with Col. C. B. Drake temporarily in charge of the motors division of the Quartermaster Department following the transfer of Gen. Baker, and Christian Girl, whose resignation has not yet been accepted, still at the head of the Motor Transport Section of the Motors Division, Q. M. C. Fourteen hundred and fifty class B trucks have been completed today not including 250 in process of production. Yesterday's production record was 110.

—

Electric Steel Acquires Crucible

CLEVELAND, May 8—The recently organized Electric Steel & Forge Co. has acquired the Crucible Steel Forge Co., Cleveland, with its established plant. J. H. Foster, president of the Hydraulic Pressed Steel Co. is president; D. W. Wells, vice-president and manager; C. R. Cross, secretary, and A. B. Smythe, treasurer. Besides the officers, the directorate includes James H. Herron, H. C. Osborn, W. D. Sayle, W. H. Staring and C. R. Hamilton. The capitalization consists of $2,000,000 preferred stock and 20,000 shares of no par common. The new company will add to and extend the plant of the Crucible company, which manufactures steel forgings of various kinds, and will install electric furnaces, rolling mills and complete equipment for fabricating and producing carbon tool steel and special alloy steels. The enlarged plant will have a capacity of 9000 tons.

—

Firestone Separates Rim Division

AKRON, May 8—As a matter of operating economy and efficiency, the Firestone Tire & Rubber Co. is separating its rim manufacturing division from the Tire & Rubber Company, so that the rim plant may be entirely in the hands of skilled steel men. The Firestone Steel Products Co. is being formed to take over the rim end of the business. Stock of new company will all, except directors' qualifying shares, be owned by the Firestone Tire & Rubber Co. J. G. Swayne, present manager of the rim plant, will be vice-president and factory manager of the new company, and present officers and directors of the rubber company will have leading places in the new concern. It is stated that the plant uses 30,000 tons of steel a month.

—

Standard Ordnance Tractors Designed

WASHINGTON, D. C., May 9—The Motors Division of the Ordnance Department has completed designs for standardized 2½-, 5- and 10-ton tractors. Production has started on the 5- and 10-ton sizes. The 5-ton model uses the B type engine now incorporated in the standardized Liberty trucks. The engine has been changed to overhead valve type and develops 55 hp. Six thousand of these engines have been ordered and are in production. The tractors will be assembled on the progressvie plan by Maxwell and Reo. The 5-ton tractors develops a speed of 12 m.h.p. and is governed at 6 miles.

—

Shortage of Tool Makers

WASHINGTON, D. C., May 9—The Department of Labor states that there is a shortage of tool makers and mechanics and munition factories are operating at 75 per cent of capacity because of this shortage.

—

Large Attendance for S. A. E.

280 Reservations to Date for Orville Wright Dinner—More Program Details

NEW YORK CITY, May 9—To date, 280 tickets for the Orville Wright Dinner to be held in connection with the Summer Meeting of the Society of Automotive Engineers, at Dayton, Ohio, Monday and Tuesday, June 17 and 18, have been sold, and according to present indications it would appear as if 1000 might sit down to the dinner. It is peculiarly opportune that such a dinner could be held in Dayton, Ohio, at a time when the airplane is one of the leading factors in the great war.

The program of papers which will supplement the various exhibits and demonstrations is practically complete. The question of propeller manufacture will be the subject of a paper which will be supplemented by a specially installed machine for showing the manufacture of a propeller. There will be one or two papers on other phases of airplane work. One will deal with the various types of modern planes and the characteristics of each. Others will deal with comparisons of airplane engines, etc. It is expected that a paper will be presented in connection with tractor activities outlining possibilities of re-designing farm machinery to make such more adaptable to tractor operation.

Dayton Members Busy

S. A. E. members in Dayton are taking up the work not only of looking after many of the arrangements but also preparing to take care of the members while at the meeting. A special committee in charge of this work and with headquarters at 137 North Ludlow Street, Dayton, Ohio, is made up as follows: Honorary Chairman, Orville Wright; chairman, Vincent Apple; secretary and treasurer, F. H. Hoover, and members, J. M. Schoonmaker, F. J. Blose, Captain Howard Blood, John M. Hoffman, Carl Buest, I. B. Swagles, and W. B. Stout.

—

Northway to Make Truck Engines

NATICK, MASS., May 8—The Northway Motor Corp. has been formed here by R. E. Northway, formerly of the Northway Motor & Mfg. Co., Detroit, and will equip a new plant for the production of truck engines. It is understood that an order for 3000 engines already has been secured.

Automotive Industries

VacuumTank Patent Not Infringed

Stewart-Warner Will Appeal Decision—Court Holds Jay Patents Valid

CHICAGO, May 7—That the Stewart-Warner patents, covering its vacuum feed system, are valid but have not been infringed by the Thermo-Vacuum System, is the gist of a decision which has just been rendered. The suit was brought by Webb Jay and the Stewart-Warner Speedometer Corp. against Frederick Weinberg and the Auto Parts Co., Detroit, and charged infringement of patents No. 1,067,814, issued to Higginson & Arundel; 1,132,273, to Jay, and 1,134,457 to Jay, upon a vacuum tank for automobiles. Judge Sanborn, in the United States District Court for the Northern District of Illinois, rendered the decision. The Stewart-Warner Corp., which alleged that ten claims of the two Jay patents were infringed, will appeal.

Judge Sanborn decided that he did not find in the Weinberg tank one element made vital by the Jay patents, this vital element being the breaking of the vacuum by admitting air by raising of the float in one patent, and by a normally open valve in the other. He considered this distinction a most vital one in the two patents. He declared that Mr. Jay did not solve by either of his patents in the suit all of the difficulties of the vacuum tank problem.

He contended that many patents may be a part of the final success and that they must be considered steps in advance, whether commercial successes or not. The advance towards the eventual tank is gradual and proceeds step by step so that no inventor can claim the complete whole and that each inventor is entitled to the specific form of tank which he produces.

In his report, Judge Sanborn states that Stewart-Warner has supplied its feed tank in commercial form not made under the patents in suit, for about 140 manufacturers, and in the 3 years ending January, 1918, has supplied 1,595,577 of these tanks. The commercial structure, as sold, does not follow strictly any of the patents in suit.

After outlining the general method of operation of the vacuum tank principle, Judge Sanborn concludes that it involves five phases, as follows:

1—A suction connection with a source of supply.

2—A suction connection with a source of suction.

3—A receptacle in which suction is created.

4—Means in the receptacle, when it is filled with liquid, by which the suction is cut off, and atmospheric pressure restored, and

5—Means to permit the flow of liquid outwardly from the receptacle, which means must be closed by something when the suction takes place, so as to allow suction and perhaps prevent liquid being drawn by virtue of the suction.

In commenting on these having been previously accomplished Judge Sanborn continues:

"All these essential things have been done by inventors in the art of raising water by suction, notably by Savorgnan No. 566,625, Aug. 25, 1896, and Frings and Mueller No. 232,638, Sept. 8, 1880. All that remained for inventors in the automobile fuel supply line was first to discover that the water system was applicable and then make changes in that system to fit it for new conditions.

"So far as this record is concerned, this transformation has not even yet been accomplished unless by the defendant Weinberg.

"It might indeed be considered invention to take over this water system and successfully apply it to the very exacting conditions of automobile use, and the person who was able to do this might be thought a worthy inventor; but we don't know who he is. Jay's commercial tank has been highly successful. Weinberg's has also been successful to the limited extent it has been tried.

"Both Jay and Weinberg claim priority, but this record affords no means for determining the question.

"Of course it is urged by plaintiffs that Savorgnan and Frings and Mueller are not in the same art, but it seems they should be so regarded, as they were in the patent office. In an amendment to the specifications of the Jay double tank patent it is said:

"'It will be obvious that other liquids than fuel may be fed by the device described.'

"Regardless of the uses to which such an apparatus may be put it is all in the art of raising liquids from a low level to a high level by alternating suction and discharge, by destroying the suction. IT IS NOT CORRECT TO SAY THAT THE AUTOMOBILE ART SO CALLED IS ENTIRELY DISTINCT IN ITSELF, BECAUSE THE APPARATUS USED IS PRECISELY THE SAME THING AND WORKS IN EXACTLY THE SAME WAY AND ATTAINS EXACTLY THE SAME RESULTS WHETHER EMPLOYED IN RAISING WATER FROM A LOW LEVEL TO A HIGH LEVEL OR IN RAISING GASOLINE FROM A LOW LEVEL TO A HIGH LEVEL.

"There may be other considerations and other circumstances which may modify the delivery, but that is not a part of the liquid elevating device. For instance, it might be desirable to not have too much head under the carbureter of the car; it might be desirable to place the main liquid tank low enough so that the tilting of cars on grades would not affect the action by reason of causing the apparatus to overflow; it might be desirable to modify the apparatus in some other respect due to the heating and expansion of liquids or boiling point of gasoline; BUT NONE OF THESE THINGS AFFECTS IN THE SLIGHTEST DEGREE THE

Continued on page 927)

Suspect Politics for Outburst

Airplane Upheaval Laid to Certain Self Interests in Some Quarters

WASHINGTON, D. C., May 8—There is considerable suspicion around official Washington that not a few of the reasons back of the recent outburst against the Aircraft Production Board are due to two causes, first, politics, and second, the selfish interest of manufacturers interested in the manufacture of other types of airplane engines and parts. Certain foreign airplane manufacturers have been anxious to place contracts for their types of planes and naturally discrediting the Liberty engine would work in their interest. There are certain manufacturers who have been hoping to secure contracts from these foreign concerns and naturally they have lent their influence to the recent upheaval.

Sunbeam Interests Expect Orders Soon

It is reported here that the interests behind the British Sunbeam engine are about to realize success and that some orders for this engine are to be placed in the near future with American manufacturers. Willys-Overland has been manufacturing this engine in its factory in Toronto, Ont., and making parts for it in many of the American factories.

It is reported that orders have also been placed for the S. P. A. D. engine with the Willys-Overland Co., which company is reported to start production on this job.

—

Norway to Get Tires

WASHINGTON, May 7—A general commercial agreement between the United States and Norway assures Norway of supplies in so far as these can be supplied without detriment to this country. The agreement includes rubber tires in such quantities as will meet Norwegian needs, 250,000 tons of iron and steel, 7000 tons of copper and 1000 tons of lead.

—

Dodge Brothers Increase Car Prices

DETROIT, May 8—Prices of Dodge Brothers cars will be advanced on June 1 as follows:

Model	New Price	Old Price	Increase
Touring	$985	$885	$100
Sedan	1,425	1,350	75

Factory Education of Employees

New Departure Mfg. Co. Teaches Workers Manufacturing Processes

BRISTOL, CONN., May 7—The educational work being conducted by the New Departure Mfg. Co. here is giving such satisfactory results that in these days of shortage of labor many factories should take up such work. The scope of the work is such that employees receive information necessary in manufacturing, but which they would find it difficult to obtain otherwise.

Class in Metallurgy

An example is the class in metallurgy, which is made up of foremen, sub-foremen and laboratory men of the factory. This class aims to give a general idea of the processes that various irons and steels go through before they are delivered to the factory as raw material. It includes a study of the manufacture of pig iron, iron castings and steel. The various processes are being taken up in sufficient detail to give each person an understanding of all the processes, and also to permit them to have a talking knowledge of the manner in which raw materials are made.

Processes Shown

This is supplemented by showing the processes through which these materials go in the New Departure factory, together with an understanding of the principles on which these factory treatments are based, and the methods by which the desired results in finished products are obtained.

In addition to the increased value of the employee because of the information he has obtained, there are several other reasons behind the formation of the class:

Viewpoint Broadened

1—It broadens the viewpoint of the foreman and enables him to see that there is a reason for the numerous heat treatments through which each of the products must pass. In manufacture of bearings, this is a matter of first importance.

2—It brings about cooperation between the various factory departments and the laboratories. It gives both the laboratories and shop departments an insight into each other's viewpoint. This should result in giving many of the younger men a desire to study the metallography of steel and iron and thereby increase the worth of the men.

3—After each meeting of the class there is a general discussion carried on by the men which results in a clearer conception of the work; gets the different factory departments better acquainted with each other, and leads to one department helping another. There is no hesitation in asking questions and there is a good spirit of cooperation in answering these questions.

4—Good results follow the reading of various text books, which are recommended in connection with the course. In the New Departure factory these text books are selected as a means of assistance where the work is difficult. An example is Prof. Sauveur's course in metallography.

—

Airplane Mail Service to Start May 15

WASHINGTON, May 7 — Airplane mail service between Washington and New York will start May 15 as planned. Military airplanes for the service are being assembled at Mineola, where experiments in dropping mail sacks while the planes are in motion will be made.

Sealed parcels as well as letters will be accepted for the initial trip on May 15. During the early stages of the service no attempt will be made to despatch airplanes on rainy or foggy days. In such weather the mail will be sent by courier on trains and receive special delivery service instead.

A bill authorizing the Post Office Department to charge not more than 24 cents an ounce for transportation of mail by airplane was adopted by the Senate yesterday and now goes to the House.

—

Quadruples Navy Airplane Output

WASHINGTON, May 7—Quadrupling of the output of the navy's airplane factory at Philadelphia has been ordered by Secretary Daniels. This will be accomplished by making the plant an assembly center for navy aircraft and by placing contracts for parts of machines with numerous manufacturers.

Figures of production cannot be mentioned, but by 8 months after its inauguration this factory has achieved the maximum output possible with existing facilities. It will change its system of operation to meet the navy airplane demands. Many of the machines manufactured are equipped with Liberty engines.

—

Ask $1,000,000,000 for Airplanes

WASHINGTON, May 7—An appropriation of $1,000,000,000 for airplanes has been asked of Congress by the War Department. Other appropriations included in the budget call for $5,780,335,383 for the Quartermaster Department and $3,378,302,801 for the Ordnance Department.

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Pilot Price Increase

RICHMOND, IND., May 6—The Pilot Motor Car Co. has increased the price of its 4- and 5-passenger touring cars from $1,295 to $1,395.

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Hupp Advances Price $100

DETROIT, May 6—The new prices of both the Hupp touring car and roadster are $1,350 instead of $1,250. This advance was effective May 1.

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First Rural Express Truck in Washington

WASHINGTON, May 7—The first truck of the newly inaugurated rural motor truck transportation system arrived here from Manassas, Va., yesterday. It reported to the Return Loads Bureau and took a return load back to farmers who had ordered the goods by telephone.

Women in Factories Satisfactory

Manufacturers Say They Learn Quickly and Are Efficient as Skilled Workers

DETROIT, May 7—A visit to three of the local plants revealed the fact that manufacturers are much satisfied with woman labor. The strong point made by officials of each of these factories was the fact that women are more reliable and conscientious workers and as a rule more efficient than men.

At the Hupp Motor Car Corp. approximately 300 women are employed and more are being added from time to time. Ultimately, 600 women will be on the payroll. Women are employed in the stock rooms, at disassembling, as inspectors, throughout the top department, in the upholstery department and in the assembling of running boards, fenders and electrical equipment. Many work at drill presses, in the service department and at grinder work, but this is mostly on light parts.

The cost of training a woman for production work is estimated at $200. This takes into consideration the non-productivity of the machine while the worker is learning, the resultant waste of material, the time of an instructor taken off production, and the pay of the woman. The women receive 25 cents an hour at the start and this is increased as they become more efficient. The women now engaged on disassembling parts, thereby becoming acquainted with the various parts and their proper places, will later be placed in the assembly department.

One remarkable feature about the introduction of women in the Hupp plant was the fact that it has not caused a single complaint from the men because of their presence.

The McCord Mfg. Co. is experimenting with the employment of women, now has 30 in its employ and has provided temporary accommodations for them. A few are engaged in light assembly work, a number at fin straightening, some in the stock room, and many are working as inspectors. The company is also trying women out in various other lines of work. A little skepticism was expressed at first when it was suggested women be used for fin straightening. It has developed, however, that the women have more than doubled the first day's record of any man starting this work. A woman had turned out thirteen radiators the first day, while the best record of any man heretofore was only six. On one job where piece-work is counted, the best any man has been able to do was 40 cents an hour. One girl is averaging 53 cents, and as a whole, the women are quick to grasp the work.

The company believes that the employment of women will materially reduce turnover.

The Saxon Motor Car Corp. uses 8 girls to drive cars around the plant from one department to another. All of them

have worked before. One of the girls was taken from the office, a second was a government investigator, another a house detective, and the others worked with the Packard company, checking and packing army truck parts. The foreman reports they are learning fast, and that two of the girls are already expert drivers.

Rest rooms, with a couch, chairs, lunch tables, etc., have been provided for them. The girls do no testing—they simply drive the finished cars to the loading dock.

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104 New Members in Detroit S. A. E.

DETROIT, May 8—The Detroit Section of the Society of Automotive Engineers has enrolled 104 associate and active members since Dec. 4, 1917. The section has lost 124 members through delinquency in payment of dues.

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Minneapolis S. A. E. Has Last Meeting of Season

MINNEAPOLIS, May 7—A report of progress in research work as to resistance to rolling of tractor wheels in soft soil was the chief feature of the last meeting for the season of the Minneapolis Section, S. A. E., on May 1.

The occasion was marked by the installation of the new officers and by the annual dinner. H. C. Buffington, the new chairman, presided. The progress report was read and slides illustrating it were shown by Amos F. Moyer of the experimental engineering department of the University of Minnesota. Dean J. R. Allen, of the university engineering department, discussed foreign trade opportunities of the United States, and G. M. Gillette, vice-president of the Minneapolis Steel & Machinery Co., discussed war conditions.

High tribute was paid to Professor Moyer for his research work. It was decided to continue the work, and Professor J. L. Mowry offered to assist in the further development of the theory.

—

Adopt Standard Track for Farm Wagons

LOUISVILLE, KY., May 7—The farm wagon department of the National Implement & Vehicle Assn. has decided to adopt a standard track of 56 in. for all farm wagons, so that they will conform with motor vehicles. This change will be made effective not later than Jan. 1, 1920, the intervening time being allowed to use up stocks of wagons now on hand. Heretofore wagons have been made in a variety of tracks, the two principal ones being 54 in. and 60 in.

—

Another Lawson Airplane Finished

GREEN BAY, WIS., May 7—The Lawson Aircraft Corp., which built a training type of airplane about 2 months ago, has completed a second type. Tests were made last week, including 6 separate flights within 2 hours. Albert W. Lawson, chief engineer of the company, kept the plane poised in practically a stationary position for 15 minutes at an altitude of 5600 ft.

Good Reports of Fordson Tractor Work

Majority of Machines Sold to Michigan Farmers Already in Operation and Giving Satisfaction

LANSING, MICH., May 6—Good reports are coming from many quarters of Michigan on the work of the 554 Fordson tractors distributed by the War Preparedness Board, as the majority of these tractors are in operation. The tractor is doing good work and has ample power. It is easy to operate and is giving little if any trouble. Its speed is a factor that is being appreciated.

None of these tractors has been running long enough to show wear or breakage. No conclusion can be reached as to the life of the machine. The consumption of kerosene is running a little more than 2 gal. to the acre in parts of the state which have been visited. Many farmers are not keeping sufficiently accurate records to give more than general statements.

Tractors Do Heavy Work

On one farm a Fordson was plowing on rather heavy clay soil. The land is rolling, some of the grades being quite steep. With the plows set so that they were cutting nearer 16 in. than 14 in. of furrows width, and with the ground plentifully sprinkled with tough alfalfa roots, the tractor moved at its regular speed except on the steeper grades. The furrows were 7 to 8 in. deep and the work good enough to satisfy anybody.

There is much discussion as to what methods Henry Ford will use in merchandising this tractor. It is reported he expects to fill the quota of 1000 through the regular agencies. These agents pay him $750 f.o.b. Detroit for the tractors, which is the same price that the farmers have paid the War Preparedness Board. The dealers are instructed to sell the tractors at $800, which price includes service on those tractors which have already been sold.

The merchandising of the plows to go with the tractor is not so definite. They will sell for $180. It is believed the agency for the Oliver plow, which is being used, will be given to Ford agents, although this has not been definitely announced.

One matter in connection with tractors has been well demonstrated, and that is the necessity for accessibility. Where a bearing has to be taken up, such as on the crankshaft, the work has to be done on the field, and the greater the accessibility the shorter the time required for the job.

In taking up one of the bearings which had been damaged by emery, the status of the Fordson in this matter came in for attention. To remove the bottom of the crankcase it is necessary first to drain the crankcase of oil and also remove the cooling system of water. The triangular brace connecting the crankcase with the front axle has to be removed. It is necessary to disconnect one end of the steering rod before the loosened crankcase can be taken out. This bottom is held by thirty bolts, all of which must be removed. As all of this work must be done in the field, the job becomes naturally more difficult than if it could be done in a garage or factory.

One or two dealers in Michigan have already decided upon a service policy, which includes preparation for speedy repairs on any tractor within a distance of 30 miles of the agency. Such service would apparently include bearing trouble such as the case above cited, which was due to the emery. Where service must be given, it is important to do the work as speedily as possible. The job of repairing a bearing is one that cannot be done by many farmers, and dealers must be prepared to give adequate service until such time as the farmers are better prepared to handle these difficult jobs.

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Michigan Registration to Be 250,000

LANSING, May 8—Despite the fact that it was generally believed that fewer cars would be operated in Michigan this year, the number of licenses already issued is almost as large as the total for 1917. Last year 206,000 cars were licensed, and the 1918 permits are already at the 206,000 mark. The estimated number for the year is 250,000.

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3 More States Order Tractors

DETROIT, May 8—Three more states have ordered Fordson tractors to be delivered to farmers. Wisconsin has ordered 500, Virginia 200 and Tennessee 100 of the machines. Virginia ordered the tractors some time ago, but delivery was withheld until the needs of England had been fulfilled. The tractors ordered by Virginia will be delivered by a Richmond company gratis.

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Germans Have New Fighting Plane

NEW YORK, May 4—An American airman in France has brought down a new type of airplane known as the Pfalz D 3. This is a single-seater German chasing machine. It is extremely small, the entire spread being less than 32.8 ft. It is a good deal like the Albatross, but does not seem to have much ascension speed. Another plane of the same type has been brought down by a French aviator.

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Bonus for Fairbanks-Morse Employees

BELOIT, WIS., May 7—More than 6000 employees of the Eclipse works of Fairbanks, Morse & Co. will share in a bonus system which the company has inaugurated. All employees remaining in continuous service for one year will receive an extra payment of 10 per cent on their earnings, payable quarterly. The bonus will be paid only to those receiving less than $2,100 annually, not including overtime.

Restrict Rubber Imports to 100,000 Tons

Cut of 37½% During Present Quarter as Experiment—Option to Government on Imports at Set Price—Reduce Pneumatic Tire Sizes

WASHINGTON, May 7—The War Trade Board, which as was told in AUTOMOTIVE INDUSTRIES last week, has taken steps to restrict imports of rubber from overseas points by 37½ per cent during the present quarter of the year, is considering a plan to extend the restriction so that not to exceed 100,000 tons of rubber can be brought in during the year. This is a reduction of about 39 per cent based on imports of 167,000 tons during the year of 1917.

In other words, the present quarter, which starts May 6 and ends July 31, may be looked upon as an experimental period. If the restriction at the end of the three months appears to have achieved the results for which the War Trade Board is seeking, imports will be definitely limited to 100,000 tons during the year. In the interim, manufacturers and importers are working closely with the War Trade Board and are permitted to consult it freely and to make such suggestions as they deem wise for the further conduct of their business.

As another step in the Government program, regulations have been promulgated fixing the maximum price of rubber and giving the United States Government an option on every pound that comes in.

At the same time, the War Service Committee of the Rubber Industry of the U. S. A., which is a part of the Rubber Assn. of America, has sent a letter to all manufacturers of automobiles and trucks up to 2 tons capacity urging the use of only standard pneumatic tire sizes and eliminating the use of every style bead except straightside for all tires other than 30 x 3½ and 31 x 4, which are to be clincher.

No Effect from Curtailment

It can be stated authoritatively that the curtailment of imports by 37½ per cent will have practically no effect on the tire industry during the 3 months that the regulation will be in effect. Tire manufacturers quite generally now are well stocked with crude, many of them having foreseen such action by the government, and there is no doubt but what production will go along at practically normal unless some other unforeseen contingency arises.

Following is the order of the War Trade Board outlining the new plan:

For the purpose of determining a plan of allocation, it is to be assumed that approximately 100,000 long tons of rubber will be the quantity to be licensed to be imported during the year commencing May 1, 1918. The present arrangements contemplate a 3 months' trial of this proposition in order that at the expiration of such 3 months' period, the situation shall be reviewed and the amount to be imported raised or diminished according to the facts then determined. Of this 100,000 long tons it is estimated that to fulfill the needs of the United States Government and the Allied Governments will necessitate the consumption of approximately 35,000 long tons of crude rubber by the manufacturers of this country, leaving approximately 65,000 long tons available for all other purposes.

Government requirements will first be taken care of in full. This will apparently leave to be allocated to each manufacturer for all other purposes crude rubber at the rate of 7/16 of his consumption during the year 1917.

No specific allocation shall be made to importers as such, but import licenses may be issued to importers in connection with manufacturers' certificates referred to in the next succeeding paragraph.

The War Trade Board is already in possession of the quantities of rubber consumed by substantially all manufacturers during the year 1917, so that the actual amount to be allocated can be determined. It is proposed that the War Trade Board shall issue one or more certificates to each manufacturer, certifying that the amount of rubber stated in the certificate is within the allocation to the manufacturer for the three months' period and that importers applying for an import license shall file with their applications the certificate, or certificates of the War Trade Board certifying that the manufacturer is entitled to the amount sought to be imported. . . .

Manufacturers having Government orders shall immediately forward to the War Trade Board a sworn statement of the amount of rubber required by them during the ensuing 3 months to be consumed in Government work. Using such statements as a basis, the Board will be prepared to issue to these manufacturers certificates entitling them to import from overseas an amount of rubber sufficient to meet the Government requirements.

The action of the War Trade Board in requiring importers to sign an agreement giving the government an option on all receipts has been taken as a measure to prevent hoarding and profiteering. It does not necessarily mean that the government will exercise its option, though it may do so where any indication of hoarding or profiteering becomes apparent.

In the event that the government should exercise its option, the prices established per pound are: 62 cents for standard quality smoked sheets; 63 cents for standard quality 1st Latex Crepe; 68 cents for Fine Para. Although these prices are slightly below the market at present, they are slightly higher than the average for the past 6 months. The general feeling is that the prices should have been a few cents higher.

Following is the form which the War Trade Board requires all importers of crude rubber to sign:

Option and Guaranty Clause to Be Inserted in Present Rubber Guaranty.

"That the United States Government shall have, and it is hereby granted, an Option to purchase at the prices and on the terms hereafter set forth, all or any part of the crude rubber covered by this Guaranty, and also all other crude rubber now or hereafter owned or controlled by the undersigned until sold and delivered to a manufacturer.

"In the event of the exercise of such Option, the price to be paid for crude rubber will be—62 cents per pound for standard quality Smoked Sheets, c. i. f. New York; 63 cents per pound for standard quality 1st Latex Crepe, c. i. f. New York, and 68 cents per pound for Fine Para, c. i. f. New York, and for other grades the prices shall be at their relative values as hereafter to be determined by the War Trade Board.

"That the undersigned will not sell, transfer, or deliver the rubber covered by the foregoing option, or any part thereof, to or for the benefit of any person, at a price greater than the prices set forth in the foregoing option, except such rubber as he may be under contractual obligation to deliver under a contract executed and in force prior to May 1, 1918.

"Copies of such contracts, sworn to as being correct, must be filed with the War Trade Board within five days from this date. Any deliveries made under such contracts to manufacturers, subsequent to the date on which import restrictions and a plan for the allocation of crude rubber shall be made effective, shall constitute a portion of the amount allocated to such manufacturers under such plan."—War Trade Board, by C. M. Woolley.

Schedule of Sizes

The schedule of sizes, which is given in the letter of the War Service Committee, conforms to the standards adopted by the Society of Automotive Engineers in July, 1915, with very few exceptions. Following is a comparison of the two tables, the War Service Committee sizes being in heavy face type and the S. A. E. sizes in light face:

Rim size	Even tire sizes	Odd or over size
30 x 3	30 x 3	31 x 3½
30 x 3½	**30 x 3½**	**31 x 4**
32 x 3½	**32 x 3½**	**33 x 4**
32 x 4	32 x 4	33 x 4½
34 x 4	34 x 4	45 x 4½
34 x 4½	**34 x 4½**	**35 x 5**
36 x 4½	36 x 4½	37 x 5
36 x 5	36 x 5	37 x 5½
36 x 6	**36 x 6**	——
38 x 5½	38 x 5½	39 x 6
38 x 7	**38 x 7**	——
40 x 8	**40 x 8**	——

It is expected in rubber circles that the schedule of tire sizes adopted by the War Service Committee will be put in effect by both tire and automobile manufacturers. Aside from reducing the number of sizes now produced to 9 from something like 200, an important part of the schedule is to do away with Q.D., Q.D.-Clincher and Clincher types and substitute straight side in all sizes except those for very small cars.

Following is the complete letter which has been sent out by the War Service Committee:

TO AUTOMOBILE MANUFACTURERS

At the request of the Economy Board of the Council of National Defense, the War Service Committee (appointed by the Rubber Association of America, Technical and Commercial Pneumatic tire divisions) have adopted, for the purpose of simplifying and standardizing pneumatic automobile tire and rim sizes, the schedule indicated below.

The reasons for this action, as outlined by the Commercial Economy Board of the Council of National Defense, are, briefly, to conserve space in ship bottoms now wasted

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in the importation of excess crude rubber, utilize manufacturing facilities to the best advantage, reduce capital invested in raw material and finished product, give automobile owners better service and value by eliminating the majority of the sizes and styles now required, due to the absence of any definite plan tending toward standardization of a limited but ample line of sizes and styles.

Reduce Number of Sizes

The adoption of the following schedule will reduce the number of sizes and styles manufactured and carried in stock by both tire manufacturers and their customers, from approximately 200 to 28. The schedule of pneumatic tire and rim sizes adopted as standard, follows:

Style and size	Rim
Clincher, 30x3½,	30x3½
Clincher, 31x4,	30x3½
Straightside, 32x3½,	32x3½
Straightside, 33x4,	33x4
Straightside, 34x4½,	34x4½
Straightside, 35x5,	34x4½
Straightside, 36x6,	36x6
Straightside, 38x7,	38x7
Straightside, 40x8,	40x8

This simplified and standardized schedule will ultimately result in the use of seven sizes of rims and nine sizes of tires, adequate to equip with pneumatic tires any motor vehicle up to a two-ton truck.

The Rubber Association of America requests the co-operation of the automobile industry to the end that it conform to the above sizes of tires and rims on cars to be manufactured for the 1919 season, the manufacture of which, in most instances, will begin July 1, 1918.

New Rim Size

Your especial attention is called to the new rim size introduced, viz., 33x4, it being a compromise between 32x4 and 34x4 sizes. It also requests the earnest support of automobile manufacturers in the program looking to the standardization of American inch sizes on all export shipments of cars, which will eliminate the necessity for manufacturing and carrying in stock, both in this country and foreign branches, 43 sizes and styles of millimeter clincher tires.

It must be plainly evident to your industry that so long as tire manufacturers are called upon to manufacture and carry in stock in their plants and thousands of branch stores, approximately 200 sizes and types of inch size tires and 43 sizes and types of millimeter tires, the result will be inefficiency in manufacture, excessive manufacturing costs, needless use of high cost storage space and inability to make that prompt delivery to manufacturers and car owners that would follow the adoption of the simplified standard schedule outlined above.

That it may correct these conditions and give to the United States Government that co-operation it requests through the Council of National Defense, the Rubber Industry of the U. S. A. has standardized rim and tire sizes as set forth in this letter.

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Employees Club for Harroun Men

WAYNE, MICH., May 7—The Harroun Motors Corp. has completed plans for the establishment of a men's clubhouse in one wing of the former Prouty & Glass carriage plant, and is opening this attachment to its welfare work with sleeping quarters for 100 men. A large dormitory with iron beds, ample shower and sanitary accommodations, as well as a kitchen and dining room are being installed.

102 Die in Flying Accidents

Few Fatalities in U. S. Aviation Camps Compared with Number of Miles Flown

WASHINGTON, May 7—One hundred and two deaths in flying accidents occurred at eighteen aviation camps in the United States and at Camp Borden, Canada, where American fliers are training, from the date of their establishment up to April 24. Several fatal accidents have happened since that time. At this time information is not available from the War Department as to the number of accidents, not fatal, nor a comparison with the figures showing Canadian flying accidents.

It is impossible now to determine the ratio of the number of accidents to the miles of flying, but there are few mishaps in contrast with the vast number of fliers in training, and there are fewer accidents in the American training camps than in the Canadian camps, where more advanced and short flying is done.

To April 24 there were eighty-six fatalities in the six Texas aviation camps. Fort Worth with three fields and many fliers training under English instructors had forty-nine deaths. Houston was next with sixteen.

The majority of accidents were due to misapplication of rules, ignorance of peculiar aerial conditions, faulty materials in the machines and sometimes sudden fright on the part of the aviator, or mere recklessness.

Misjudging a start has caused some accidents, owing to the overtaking of one plane by another. Rules have been made that machines passing in the same direction must have at least 200 yards to insure safety against collision. When they pass over and under there must be 50 yards, and if approaching head on, a space of 150 yards is demanded.

Landing in cross winds has occasioned some accidents, when the planes have turned completely over pinning the pilot underneath. Many of the accidents display a reckless regard for rules, many aviators falling in localities and positions showing that the pilots have paid no attention to instructions.

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Vacuum Tank Patent Not Infringed

(*Continued from page* 923)

STRUCTURE, THE PRINCIPLE, AND THE MODE OF OPERATION OF THAT WATER ELEVATING DEVICE OF SAVORGNAN PLACED BETWEEN THE LOW-LIQUID RECEPTACLE AND THE HIGH-LIQUID RECEPTACLE FOR THE PURPOSE OF TRANSFERRING LIQUID FROM ONE TO THE OTHER. IT IS NOT AN ANALOGOUS USE, NOR A NEW USE; IT IS THE SAME USE OF THE APPARATUS."

Judge Sanborn then goes on to state that in a number of patents later than Savorgnan but earlier than Higginson and Arundel, the water system was applied to the raising of liquid fuels. Some of these inventors failed because they used a constantly open, valveless air port of very small capacity for the purpose of breaking the vacuum, instead of the valve inlet controlled by the float, as in Savorgnan, Tice, Hamelin, Jay and Weinberg.

Judge Sanborn further comments:

"While Mr. Jay did not solve by either of his patents in suit all the difficulties of the vacuum tank problem, yet it would be entirely unfair to one who has finally solved that problem, and whose product in another form is being so largely used, to say that because the advance in these two patents was small and technical, they should be sustained. They are part of the final success and may be considered as steps in advance. Commercial success did not attend them, but such success is important only to help out doubtful validity. Commercial success, however great, does not prove infringement.

"Ten claims of the two Jay patents are alleged to be infringed by the Weinberg tank. On examining that tank it is found that it does not contain one element made vital by the Jay patents, which is the breaking of the vacuum by admitting air by the raising of the float in one patent, and by a normally open valve in the other. It is necessary to break the vacuum at the proper time, but this will not result from merely shutting the suction pipe connecting with the manifold. In addition it is necessary to admit air in order that the fuel may find its way to the carbureter. This element is essential to the operation of the tanks made under both patents, though not contained in some of the claims. If the defendant does not use this element or an equivalent he does not infringe."

Judge Sanborn then goes on to explain in further detail the operation of the Weinberg tank, and concludes by declaring that the most important difference between it and the Jay tank is the substitution of the closed system for the open system.

The final conclusions by Judge Sanborn are:

"Inasmuch as all of the elements in the Jay patents are old and the inventor did not solve the vacuum tank problem, and the tanks made under them have been superseded by later construction, it seems to be necessary to decide that they are not infringed. They are unavoidably narrow. By no fair reasoning are they entitled to be any more than sustained on the ground that Mr. Jay, working along his own lines, is entitled to his own construction; and the same applies to Weinberg.

" 'If the advance towards the thing desired is gradual and proceeds step by step so that no one can claim the complete whole, then each is entitled to the specific form of the device which he produces, and every other inventor is entitled to his own specific form so long as it differs from those of his competitors and does not include theirs.'

"The patents are on combinations of elements not on the elements themselves. An essential element of the combination is the means of breaking vacuum by the air port connection. It is the full combination which by the statute the inventor is required to claim. 'He shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery.' He is not authorized to claim two or four out of the six elements of his combination, but the whole six; and if he fails to comply with the statute the court will read into the claim the omitted elements for the purpose of examining into its validity or infringement. . . . It is true that a patentee may claim two or more combinations if they actually exist, and one may include another, but each must be a complete combination in and of itself and not a portion only.

"The three patents in suit are sustained and held not infringed. Bill to be dismissed with costs."

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Post-War Plans for Automobiles

Great Britain, Under Reconstruction Minister, Appoints Special Committee

LONDON, ENGLAND, April 16—The attention the British Government is planning to give the motor industry after the war, and as soon as national exigencies will permit, is indicated by the fact that the Minister of Reconstruction, who has eighty-seven different committees under his direction, has authorized the formation of a branch committee for the automobile industry, and has appointed H. C. B. Underdown to act as chairman.

Mr. Underdown, in consultation with the Association of British Motor and Allied Manufacturers, has formed his branch committee from men holding important posts in the automobile industry. The committee includes Bernard Caillard, who is a director of Wolseley Motors, Ltd., and is also managing director of the British Lighting & Ignition Co. J. W. Stocks, general manager of Components, Ltd., represents the motorcycle industry in the committee. Others on it are Horace Wyatt and Edward Powell. Arrangements are being made for the formation of sub-committees representing the various branches of the industry, so that through these channels the entire industry will be represented in the Ministry of Munitions.

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England Plans Road Work

LONDON, ENGLAND, April 16—The building of main highways for motor trucks will unquestionably be one of priority after the present war. As already suggested in these columns, one of the works of the reconstruction commission in England will be the building of truck roads. These will not always be new highways but existing roads that will be straightened out, graded and widened according to motor traffic needs. The heavy traffic of the last 3 years of war, coupled with the almost complete cessation of normal road repairs, has broken down the crust of many of the main highways to such an extent that a resumption of normal road traffic after the war would be impossible without quick steps for repairs.

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Dixon Crucible Elects Officers

JERSEY CITY, N. J., May 6—At the annual meeting of the stockholders of the Joseph Dixon Crucible Co. the following officers were re-elected: President, George T. Smith; vice-presidents, George E. Long and J. H. Schermerhorn; secretary, Harry Dailey; treasurer, William Koester; and assistant secretary and treasurer, Albert Norris. The directors re-elected are George T. Smith, George E. Long, William G. Bumstead, Edward L. Young, J. H. Schermerhorn, Harry Dailey and Robert E. Jennings.

The annual election of the American Graphite Co., a subsidiary of the Joseph Dixon Crucible Co., was held on the same day, and resulted as follows: President, George T. Smith; vice-president, George E. Long; treasurer, J. H. Schermerhorn; and secretary, Harry Dailey. The directorate is the same as that of the Dixon company.

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Chevrolet Plan Effective

NEW YORK, May 4—The plan calling for the taking over by the General Motors Corp. of the assets of the Chevrolet Motor Co. exclusive of the General Motors stockholdings became effective yesterday, all of the Chevrolet stockholders having assented. Arrangements are being made to liquidate the Chevrolet company by distributing all its stock of the General Motors Corp. to the present stockholders, the basis of distribution being 1 1/7 shares of G. M. stock for each share of Chevrolet stock held. When this is accomplished, the company will be completely liquidated, and its stock no longer outstanding. The company will constitute and be known as a branch of the General Motors Corp.

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War Board Conferring With Industries

WASHINGTON, May 7—The War Trade Board is holding numerous conferences with all industries, including rubber, tin, leather, etc., and is making investigations both of domestic and foreign conditions in these industries to determine if further shipping restrictions can be made. The urgent need for shipping facilities to Europe is the cause. Lists have been prepared of further import and export restrictions, but publicity will not be given until the Board is fully satisfied as to the results of each added embargo.

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Claims Against Indiana Standard Oil

WASHINGTON, May 4—The Federal Trade Commission has accused the Standard Oil Co. of Indiana of selling gasoline through tank wagon stations to the storage tanks of customers, and making contracts to do this. Competition, according to the claim, was stifled by the refusal of the company to deliver in carload lots gasoline which could be shipped where higher prices prevailed.

Another claim charges that the company sold its products at wholesale prices to consumers through tank wagons in districts where there was competition. The company is also supposed to have maintained commission agency agreements whereby the respondent was obligated to pay dealers one cent a gallon as a rental fee for tanks, provided that the company did not handle competitive goods. It was also charged that the Standard Oil Co. of Indiana advertised that its competitors used short measure, could not make deliveries, and sold lubricating oils which did not meet the guarantees of the Standard Oil. A final charge claims that the company sold at lower prices in competitive districts, and higher where there was no competition.

English Control of Industries

Believed That by End of War Government Will Supervise All Trade Activities

LONDON, April 16—Some light on the control of industries by government during the war, and in the period immediately following the war, so far as the British Isles are concerned, was given at the annual meeting of the Associated Chambers of Commerce of the United Kingdom held recently. The retiring president, Sir Albert Stanley, believes that at the close of the war practically the whole of the trade and industrial activities of the country will be in some form controlled directly or indirectly by the Government; and that at the end of the war it will be the function of the Government to begin the abandonment of these controls as the national position will permit. It is questionable if the control of railways and canals will ever revert to the pre-war status.

After 3½ years of war, the production of the British Isles is not appreciably less than before the war. Outside of war production the British Isles are doing little more than providing for immediate and bare necessities, but it is necessary to maintain maximum efficiency and economy of production, and above all, the largest possible output. For this it is necessary to have complete co-operation between employers and employees.

Edward Manville, who is chairman of the Daimler Co., Ltd., Coventry, is the new president of the Associated Chambers of Commerce of the United Kingdom. This is the first time that an automobile man has filled this position.

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Michigan Counties Get Tax Money

DETROIT, May 6—Counties in the State of Michigan will receive half of the automobile license fees collected up to April 1. This amounts to $773,589.90. The state will receive a similar amount, and in addition $59,991.77 collected as non-resident fees, transfers, etc. This brings the state's total to $813,580.

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Michigan Has No License Tags

LANSING, May 6—The State of Michigan has exhausted its supply of automobile license tags. The office of the Secretary of State is now nearly 7000 behind, and the Secretary is in Chicago attempting to speed up shipments from the manufacturers.

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Coffin's Work Appreciated

WASHINGTON, May 4—An appreciation of the work of Howard E. Coffin, retiring chairman of the Aircraft Production Board, is contained in resolutions adopted by the Naval Consulting Board and telegraphed to Mr. Coffin at his home

in Georgia, where he is recuperating. The resolutions follow:

The Naval Consulting Board at its session in Washington to-day sends its most cordial greetings to its member, Mr. Howard E. Coffin, with best wishes for his speedy recovery to full health and vigor and takes this occasion to record that at that critical time when the new airplane program was planned there were few men in America who had the vision, foresight and imagination to recognize that hundreds of millions of dollars should be appropriated for aerial equipment and fewer still who were capable of organization for the effective expenditure of such vast sums of money for national defense. Among these he was foremost. The board further resolved that this resolution be transmitted by telegraph to Mr. Coffin at his Georgia home.

(Signed) THOMAS ROBINS,
Member and Secretary.

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Washington Service Bureau to Direct Strangers

WASHINGTON, May 7—A Service Bureau has been established by the Government in the Home Life Bldg., 15th and G Streets, to direct strangers, including salesmen and manufacturers, to the proper Government department. The bureau will also give information concerning Government activities, care for letters and persons trying to reach members of Congress, and assist Government officials in getting in touch with special offices and departments.

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Schlecht Elected St. Louis President

ST. LOUIS, May 4—The St. Louis Automobile Manufacturers and Dealers Assn. has re-elected as president Joseph A. Schlecht of the Mound City Buggy & Auto Co. The other officers follow: Vice-president, P. H. Brockman, DeLuxe Automobile Co.; treasurer, H. L. Schnure, Velie Automobile Co.; directors, F. W. A. Vesper, Vesper-Buick Automobile Co.; F. R. Tate, Tate-Gillham Motor Car Co.; I. G. McNiece, Cadillac Automobile Co.; W. L. Johnson, Johnson Automobile Co.; W. S. Roberts, J. I. Case T. M. Co., and C. R. Frampton, Hudson-Phillips Motor Car Co.

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Kettering Addresses Engineers

CHICAGO, May 6—President C. F. Kettering of the S. A. E. lectured on the Automobile Power Plant before the American Institute of Electrical Engineers, the American Society of Mechanical Engineers and the Western Society of Engineers recently. He predicted that the future internal combustion engine will be encased in an asbestos jacket, in much the same way as a steam engine, and that better thermal efficiency will be realized by placing a by-pass in the water outlet operated in conjunction with the throttle lever. President Kettering outlined the principles of operation of the internal combustion engine and discussed the pre-ignition knock theory. He also touched on the developments leading to the design of the Liberty engine.

New York Exports Less

Ratio of Shipments from Metropolitan Port to Total Amount Decreasing Steadily

NEW YORK, May 6—Shipments of automobiles, trucks and parts from the Port of New York during March amounted to $3,779,204, only 46 per cent of the total amount exported from the United States. The percentage of shipments from New York in relation to the entire amount during February was 60 per cent and in January 72 per cent.

None of the cars being sent to Canada go via New York. Formerly a large part of those destined for Australia, the Philippines and other parts of the Far East were sent through this port. At present, this has been greatly reduced. Only 79 cars out of the 248 destined for Australia and 6 of the 144 cars for the Philippines went via New York.

Cars and trucks for the Allies, however, are practically all sent this way. The 84 cars and 143 trucks shipped from New York form the entire amount sent to France during March. No cars for England were shipped through any other port, but only 125 of the 155 trucks sent to the United Kingdom went via New York.

The amount of parts being shipped is increasing steadily, and forms the largest percentage of New York shipments.

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Muskegon Making 2-Ton Truck

MUSKEGON, MICH., May 7—The Muskegon Engine Co. is manufacturing a new 2-ton truck, styled Model 20. This has a Continental 4-cylinder, 4⅛ x 5¼ in. engine, Eisemann ignition, Stewart carbureter, Bower bearings and Torbensen rear axles. The wheelbase is 144 in., the weight of the chassis 4080 lb. and standard equipment includes front fenders, running board and 3 oil lamps. The chassis price, including lazyback seat is $2,145 and the cab, with windshield and standard stake body will cost $215 extra.

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Automotive Strike Settled in Minnesota

MINNEAPOLIS, May 7—The first settlement of labor difficulties in Minnesota under the new arrangement, according to which all troubles must be referred in advance to the Minnesota Arbitration Board, concerned the Minneapolis Threshing Machine Co. A short-lived strike was settled by the decision that the 500 employees of the company shall work 9 hours daily, but receive pay for 10 hours.

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Addition for Case T. M. Co.

RACINE, WIS., May 7—The J. I. Case T. M. Co. has awarded contracts for an addition to its South Works. This will be used largely for foreign orders of Case tractors.

Automobile, Truck and Parts Exports from New York for March

Country	Passenger Cars No.	Passenger Cars Value	Commercial No.	Commercial Value	Parts Value
Aden	1	$854	...	....	$35
Argentina	79	49,520	...	....	43,342
Australia	89	79,015	...	....	31,262
Azores	...	....	...	....	198
Barbados	5	1,825	1	$600	427
Bolivia	4	9,665	...	....	1,344
Brazil	130	81,010	1	2,750	38,751
British East Africa	32	18,989	...	....	5,955
British East Indies	1	1,255	...	....	1,969
British Guiana	33	16,598	6	4,500	6,646
British India	25	8,800	...	....	36,068
British South Africa	90	72.537	2	4,450	133,715
British West Indies	3	1,060	2	1,200	266
Chile	92	116,026	1	1,474	39,491
China	3	3,490	...	....	2,015
Colombia	...	....	...	....	2,068
Cuba	15	44,866	33	50,661	28,355
Danish West Indies	...	....	...	....	139
Dutch East Indies	...	....	1	1,840	525
Dutch West Indies	...	....	...	....	193
England	189	485,878	100	307,448	340,194
Ecuador	...	....	...	....	459
France	84	199,644	143	569,052	514,034
French Africa	...	....	...	....	692
French Guiana	1	587	...	....	19
French West Indies	1	869	...	....	2,515
Guatemala	...	....	...	....	134
Hayti	3	1,909	...	....	699
Honduras	2	1,300	...	....	525
Italy	17	9,276	...	....	6,016
Jamaica	8	5,476	2	800	4,932
Japan	107	79,851	1	1,197	2,520
Madagascar	1	854	...	....	125
Mexico	4	8,260	4	17,121	3,799
Morocco	...	....	...	....	65
Newfoundland	...	....	...	....	397
Nicaragua	4	2,276	...	....	229
Norway	1	500	...	....	...
Panama	3	2,630	14	8,630	2,270
Peru	17	22,670	...	....	2,944
Philippine Islands	6	7,746	...	....	3,071
Portugal	9	9,774	...	....	3,133
Salvador	1	3,000	...	....	521
San Domingo	25	13,004	...	....	1,902
Scotland	...	....	25	85,000	....
Siam	...	....	...	....	675
Spain	9	6,466	...	....	869
Straits Settlement	20	7,600	...	....	12,256
Trinidad	4	5,805	...	....	3,750
Uruguay	42	35,084	...	....	15,607
Venezuela	15	6,000	...	....	2,974
Total	1,181	$1,422,241	336	$1,056,723	$1,300,240

Aircraft Investigation Needed to Clarify Situation

(*Continued from page* 896)

We could scarcely expect our engineers to become supermen overnight. They did the best that was humanly possible. They consulted with English engineers, French engineers, Italian engineers, and sent a commission headed by one of our leading engineers, Major Howard Marmon, to Europe to study conditions.

The Liberty engine was developed during his absence, and it is not surprising that when he returned from his investigation on the French and Italian fronts, and after visiting many airplane factories, he should recommend changes in the engine; and that French, Italian and English engineers should also have additional information to that available through the representative of those countries in Washington when the Liberty engine work was started.

Clerical Mistakes Have Been Made

There have been delays and mistakes in the clerical work connected with the Liberty engine. Changes have been made, and factories were not immediately advised to make such changes. The result was that factories went ahead on the production of certain parts only to find out later that the design was changed, and the parts made had to be discarded.

The manufacturers were, however, protected in this, and the loss absorbed in a salvage account. There was bound to be some of this, but there was too much. There is some just criticism against the department of the Aircraft Production Board which had the matter of communicating these changes to the different factories in hand. While manufacturers were not actually losing money through these changes, their morale was being sadly disturbed. One factory threatened to shut down all effort at production until it knew the exact status of the different designs entering into the engine.

One of the most disastrous things at present is the chaos of Washington rumors on the situation in general. The investigation will set these at rest. It must be an investigation for the people, and give them the information they should have, at the same time keeping secret that information which would be a valuable aid to the Central Powers.

Other Engines Being Built

The airplane activities in America are not all confined to the Liberty engine. The manufacture of the Hispano-Suiza engine for training purposes has been going along in apparently a satisfactory manner. The Wright-Martin Co., manufacturing this engine, spent many millions in learning how to produce it and get into production. It is stated the figure approximates $10,000,000, and this is cited as an example of the difficulties involved and the time necessary for a factory schooled in high-class work to get into production.

The Bugatti, an Italian design of engine for scouting purposes, is being taken up, and some factories have been working for many months on getting it shaped up for production. The Bugatti is considered one of the best types of aviation engines built in Europe.

Reports from Europe tell of the great difficulties our Allies have had in the development of new types of aviation engines and of the long time required in such development. Fiat, which is one of the largest producers of automotive apparatus in Europe, has been known to have certain sizes of engines under development for considerably over a year, but is not yet willing to go into production on them. The same applies to some French engineering firms of the highest standing.

The criticism has frequently been made against the policy of the Aircraft Production Board in not distributing its aviation engine contracts to scores of firms in the automobile industry. The board has constantly defended its action on the ground that a factory designed for the production of a complete automobile would not be efficient in the production of Liberty engines.

Such a factory has a part for engine manufacture and assembly. It has a part for gearbox manufacture and assembly. There is another part for axle manufacture and assembly. All of these departments are not suited for engine manufacture, and a factory desirable for building aviation engines has to be specially laid out and equipped for that line of work.

There have been many complaints that three of the factories getting Liberty engine contracts had not only to build their factories but entirely equip them with machinery. The reason for this was that the Aircraft Production Board was convinced that to build engines in production quantities, as demanded by Europe, could only be accomplished by such a policy.

Engines Might Have Been Farmed Out

There is no reason, however, why many thousands of engines could not have been built on the farming-out basis among a score or more of manufacturers. For example, Rolls-Royce is to-day having built in America considerably over 1000 of its engines. The crankshafts and camshafts are being built in one factory; the cylinders and crankcases are being machined in another part of the country; pistons and connecting rods are being built in different places.

If it is possible for a firm like Rolls-Royce, with a design that is admittedly difficult to manufacture in American shops, to make the progress that it is making, then it must be admitted that the Aircraft Production Board could have paralleled its development of the Liberty engine with a reasonably strong program embracing the manufacture of several types of European engines that are to-day defending the Western line against the Hun machines.

It can scarcely be construed as anything but an error, but it is much easier to see it as an error to-day than to have seen the necessity of it a year ago, when we were not able to visualize all of the difficulties that have confronted us in the development and production of the Liberty engine.

Should Establish Laboratory in France

In aviation we cannot put all of our eggs in one basket. To-day we should have a corps of ten or more of our greatest engineers continually concentrated on the development of aviation engines to meet the varied necessities of this war.

The matter seems so important that practically that many engineers of highest caliber should be in France, handling our work there, where they are in constant communication with the front. We should have a great engineering laboratory there. We might have a special service between such a corps of engineers and those at home.

The job is so huge that it demands the utmost along lines of engine and plane development at the utmost speed.

Marking Requirements for Express Shipments

DETROIT, May 8—Supplement No. 5 to the official express classification No. 25, recently issued, shows the requirements necessary for the shipping of goods by express. Requirements for shipments of automotive parts follow:

Castings, Machine Parts, Shafting, Pipe, Rods, Bars and Other Metal Articles.

1. When boxed, barreled, crated or trussed, must be marked in compliance with Paragraph B. (This paragraph provides for all shipments to be marked with pen, brush, stencil, waterproof crayon or label securely attached with glue. Shipments are to be refused when marked only with a loose tag.)
2. When not boxed, crated or trussed, and there is sufficient smooth surface for the purpose, the address must be plainly marked on the article with durable paint. Such shipments will not be accepted unless the markings are thoroughly dry.
3. When not boxed, barreled, crated or trussed, and when it is not possible to mark as provided in the foregoing paragraph, shipments must be provided with not less than two wooden, leather, metal, cloth, rope stock or sulphite fibre-tag-board tags. Rope stock or sulphite fibre-tag-board tags must test not less than 14 point, 50 per cent rope, have reinforced metal eyelets and must be attached by wire not less than 23 gauge, or strong tarred cord. Tags must be attached wherever possible to unexposed parts of the article in order that they will not become detached in handling.
4. Rods, shafting, bars, pipe, automobile springs and other articles of like character marked with tags as provided in the foregoing paragraph, must have the tags securely wired to the article, and in addition a concealed tag, bearing the same address, must be bound to the article with burlap covering, the latter securely wired at each end.
5. When metal articles are shipped in sacks, the address must be shown on a tag conforming with the specifications in Paragraph 3, attached either by wire or strong cord, and an additional tag bearing the same address must be enclosed in the sack.

Automobile Tires.

When not boxed or crated, these must have two marks, both attached to the inner surface of the tire and to consist of

(1) A strong tag securely attached.

(2) Another tag bearing the same address securely bound by burlap or cloth, or an address label pasted on the inner surface.

Lot Shipments.

Except when these are in carloads, each package or article in the lot shipment must be marked in compliance with the foregoing requirements.

Shipments not marked in accordance with these requirements will be refused at the express office.

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Oil Exports Increase in Value

WASHINGTON, May 7—Exports of gasoline, mineral oils and other petroleum products from the United States during March were slightly greater than those of March, 1917, in volume, but almost twice as great in value.

In March, 1918, a total of 372,844,485 gallons of the various kinds of oil, including crude, mineral, lubricating and fuel oil, gasoline, naphtha, etc., were shipped. This had a total value of $52,834,069. The March, 1917, amount was 360,322,948 gallons, with a value of only $29,467,433.

The largest item exported is mineral oils, with a gross volume of 210,949,885 gallons for the month. Gasoline and naphtha exports amounted to $11,930,980 for 46,756,132 gallons. This is at the rate of 23.7 cents a gallon for both gasoline and naphtha.

—

Truck Section Formed in Detroit Automobile Club

DETROIT, May 8—In recognition of the growing importance of trucks, the Detroit Automobile Club held a meeting Friday for the purpose of forming a commercial car division, in which all truck interests will be co-ordinated. Such matters as good roads, city ordinances, safety first measures and vehicle transportation legislation will be taken up in the near future.

It was brought out at the meeting that a great deal must be done along these lines before trucks can be used extensively for intercity and interstate hauling. It also seemed apparent that more good roads must be built if the work of trucks is to be encouraged. Government regulations in regard to licenses for trucks must be made broader in scope, it was said, and should apply not only to the localities in which trucks are manufactured. These regulations should be so broadened that state lines would not interfere with the free movement of trucks, according to members of the division. In this respect, it was pointed out that many states are trying to enact legislation to increase the fees for truck ownership and operation, and in other ways restrict the work of trucks and delivery vehicles on various city streets and state roads.

—

50 Per Cent Increase in Spruce Prices

WASHINGTON, May 7—Prices of spruce wood to the Government have increased 50 per cent in the last 8 months, the demand for millions of feet for airplanes being the cause. A year ago high grade spruce sold for $100 per 1000 ft. but the demand has been great enough together with an increasing cost of production to bring the price to $150. Contracts were made in February at $130, but with thousands of men called by the draft, these contracts are far from being filled.

The Canadian Government has made several contracts for spruce at $160 per 1000 ft.

—

Canadian Farmers Take 1000 Tractors

TORONTO, ONT., May 8—The demand for Fordson tractors has been so great in Canada that every one of 1000 machines ordered by the Dominion Government has already been applied for by farmers. No further applications are being accepted.

Special Export License for Certain Transit Goods

WASHINGTON, May 8—On April 29, the War Trade Board revised Special Export License No. RAC-42, which had previously been issued through the Customs Service. Under this license, all commodities of the origin, or with a destination specified in paragraphs A, B, C and D may be exported, when they are conveyed in transit through the territory, or via any port of the United States. Collectors of Customs are also authorized to allow them to be shipped when they are proposed to be exported from, or taken out of any United States port.

A. **Canada and Newfoundland.** Commodities originating in Canada or Newfoundland and destined to any country in the world.

B. **Great Britain, France, Italy and Japan.** (1) Commodities originating in, when the same are destined to the territory of Great Britain, France, Italy or Japan, or any of their colonies, possessions or protectorates, provided, however, that this license does not cover shipments of commodities which have crossed or which it is proposed shall cross the United States from an Atlantic to a Pacific or Gulf port, from a Pacific to an Atlantic or Gulf port, or from a Gulf to an Atlantic or Pacific port.

(2) Commodities originating in or destined to Great Britain, France or Italy, excluding their colonies, possessions and protectorates, provided, however, that this license does not cover shipments of commodities which have crossed or which it is proposed shall cross the United States from an Atlantic to a Pacific or Gulf port, from a Pacific to an Atlantic or Gulf port, or from a Gulf to an Atlantic or Pacific port.

C. **Latin America to Japan.** Commodities originating in South or Central America destined for Japan, and carried on Japanese vessels touching at any United States port.

D. **Spain to Cuba via Porto Rico.** Commodities originating in Spain, its colonies, possessions and protectorates, and destined for Cuba via Porto Rico.

Before allowing such shipments to be exported, the Collector of Customs at the point of exit will require, in the case of rail shipments, an extra copy of the Customs Carrier's Manifest Form 7512, on which it must be noted that the shipment is made under license No. RAC-42; or in the case of shipments by vessel, when Form 7512 is not used, the collector will require a copy of the ship's manifest on which it must be clearly shown which particular items thereon are licensed under No. RAC-42. The additional copy of Form 7512, or the copy of the ship's manifest, will be forwarded immediately by the Collector to the War Trade Board, Washington, D. C.

It should be particularly noted that license RAC-42 authorizes the exportation of no commodity which is not "in transit" through the territory or via a port of the United States. Shippers should also understand that license No. RAC-42 is an Export License and does not authorize the importation into the United States of any commodity without import license and, also, does not authorize any shipment from or to any individual, partnership, association or corporation whose name appears on the Enemy Trading List.

Exports of Oil During March and 9 Months Ending March

	March				9 Months Ending March			
	1918		1917		1918		1917	
	Gal.	Value	Gal.	Value	Gal.	Value	Gal.	Value
Mineral oils	210,949,885	$28,892,844	210,110,702	$16,739,617	1,985,399,269	$213,113,125	2,069,880,269	$161,955,605
Crude oil	7,390,269	395,179	16,378,585	596,573	124,538,343	5,882,817	134,472,565	4,942,928
Lubricating oil	25,749,333	7,309,260	21,248,195	3,831,882	205,321,745	48,471,482	193,139,363	43,090,504
Gas. naphtha	46,756,132	11,930,980	24,606,324	5,396,916	320,131,428	77,232,331	290,372,215	58,135,852
Residium, fuel oil, etc.	81,998,884	4,305,766	87,979,142	2,902,445	922,733,134	45,426,781	798,261,796	23,750,337

Men of the Industry

Changes in Personnel and Position

Several Promotions in Studebaker Sales Division

SOUTH BEND, May 6—Several promotions in the sales organization of the Studebaker Corp. have been announced. R. H. Williams, formerly manager of the Detroit branch, has been appointed assistant director of sales under L. J. Ollier, vice-president. J. E. Grady, for 3 years sales manager of the Studebaker Corp. of Canada, Ltd., will assume the added duties of manager of the Detroit branch, succeeding Mr. Williams. S. A. McGonigan, former manager of the automobile division at South Bend, will become his assistant.

L. A. Keller, who has been at various times manager of the branches at Omaha, Neb., and Portland, Ore., and more recently head of the Los Angeles branch, will be manager of branches. George L. Willman, advertising manager, has been made manager of the Chicago wholesale branch and will have direct control of the wholesale distribution of Studebaker cars in a large section of the Middle West.

A. J. Brechtel, for 2 years assistant to the sales manager of the commercial car division, has been appointed manager of the Des Moines wholesale branch.

Perry E. Newell, assistant office manager of the automobile division of the company, will be assistant manager of the Cleveland district sales organization.

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James R. Findlater, formerly general supervisor of sales of the Briscoe Motor Corp., Jackson, Mich., has been elected vice-president and director of sales.

—

Lewis L. Barnes, formerly with the Chalmers company, and previous to that district manager of the Hudson Motor Car Co., has entered business for himself as manufacturers' representative, with headquarters in Atlanta, Ga.

—

E. C. Peck, for 18 years superintendent of the Cleveland Twist Drill Co., Cleveland, has gone to Washington to do government work in standardization, and production of armament, supplies and ammunition. A leave of absence from the Cleveland company has been granted him.

—

W. T. Norton, for the last 8 years chief engineer of the Selden Motor Vehicle Co., Rochester, N. Y., has resigned from the company to join the motor truck division of the United States Army and will sail for France at an early date. He retains the title of consulting engineer with the Selden company.

J. T. Garrity, assistant general manager of the Hartford Auto Parts Co., Hartford, Conn., has joined the United States Army, and is now stationed at Camp Upton.

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L. E. Browning has been appointed district manager of the Republic Rubber Co. for Montana, Idaho, Wyoming, Colorado, Arizona and New Mexico. His headquarters will be in Denver.

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L. E. Willson has resigned his position as sales manager of the Briscoe Motor Corp., and will be associated with the Brown, Willson Co., Chicago and Des Moines. The company does a wholesale and retail automobile business.

—

S. Whitworth, formerly superintendent of inspection of the Nordyke & Marmon Co., has been appointed assistant manager of the Stutz Motor Car Co., Indianapolis.

—

M. T. Lothrop has been promoted to the position of assistant factory manager of the Timken Roller Bearing Co., Canton, Ohio. For the past 7 years he has been in charge of the steel and tube department.

—

F. C. Goldsmith, at one time superintendent of the plant of the Haynes Automobile Co., and designer of the Haynes 12-cylinder engine, has joined the New Departure Mfg. Co., Bristol, Conn. At present he is the company's representative in Washington, but in a short time will be stationed at the plant.

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R. F. Wingard, vice-president of the Guaranty Banking Corp., Chicago, has been elected an assistant treasurer of the Continental Guaranty Corp., New York.

—

George L. Brush, formerly sales manager of the Maxwell Motor, Harroun Motors, and Elgin Motor Car Companies of Canada, has joined the sales department of the Olympian Motors Co., Pontiac, Mich.

—

George M. Studebaker has resigned as a member of the executive and finance committee of the Studebaker Corp. of America, Detroit, and has relinquished all his duties in connection with the operation of the business. No future plans have been announced yet.

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Chevrolet Service Managers Convene

FLINT, MICH., May 4—Zone service managers of the Chevrolet Motor Co. closed a 3 days' session here yesterday. More than 20 were present and there were 36 present at the dinner given Thursday evening. F. A. Bonham, manager of the parts and service division, presided at the business sessions. M. E. Coyle, comptroller, and J. H. Newmark, manager of the advertising division, made addresses.

New Companies Formed

Latest Additions to Ranks of Automotive Industries

Automobile Men Organize H. L. & W. Sales & Mfg. Co.

DETROIT, May 6—The H. L. & W. Sales & Mfg. Co., organized for the production of tools, jigs and fixtures, includes in its personnel S. H. Humphries, now factory manager of the Wright-Martin Air plane Corp.; A. C. Leverton, formerly superintendent of the Chalmers Motor Co., and A. B. Williman, formerly superintendent of purchases of the Hupp Motor Car Corp.

—

Independent Harvester Co. Formed by Milwaukee Capitalists

MILWAUKEE, May 7—The Independent Harvester Co., Ltd., has been formed by capitalists of this city who recently purchased the business of the Independent Harvester Co., Plano, Ill., from its receiver. The new company has an authorized capital stock of $3,500,000, of which $1,000,000 will be preferred stock and $2,500,000 common. All of the assets and approved liabilities of the old company have been assumed.

Manufacture of farm machinery and tractors will begin shortly. The Milwaukee men interested in the company include Grant and Lawrence Fitch and Francis Bloodgood, Jr.

—

Marwin Truck Buys Wisconsin Plant

KENOSHA, WIS., May 7—The Marwin Motor Truck Co., Chicago, recently organized with a capital stock of $1,000,000 to manufacture trucks and tractors, has purchased the plant of the Skidd Mfg. Co. here. The buildings are being retooled and made ready for production.

—

Wisconsin Plant to Make Axles

MILWAUKEE, May 7—The Wisconsin Gear & Axle Co., recently organized and now building the first unit of its plant, will manufacture automotive gears and axles, and specialize in a safety castor front axle for motor vehicles. Production will start about June 15. The company has rented temporary headquarters here, and elected officers as follows: President, Jacob Schamer; vice-president and general manager, C. E. Frederickson; secretary and treasurer, H. G. Bruhuke; directors, Herman Noll, George Gluick, M. W. Weber, Charles Evers and the officers.

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Frank Hopewell Dies

BOSTON, May 3—Frank Hopewell, president of L. C. Chase & Co., of this city, died last week.

Commerce Motor Car Co. Marketing 1-Ton Trucks

DETROIT, May 5—The Commerce Motor Car Co. is marketing a 1-ton truck, the chassis of which will sell for $1,340. It is equipped with Bijur starting and lighting and Dixie magneto ignition, the magneto and generator being driven in tandem. There is a choice of 3 types of bodies as follows:

Model	Price
EA open express	$1,375
EH open express with top	1,450
ES stake body	1,490

Shipments on this model have already started.

—

Dodge Munitions Plant Complete

DETROIT, May 4—The Dodge Brothers munitions plant is completed and fully 80 per cent of the machinery is already installed. As much production as is possible with the available equipment has been started.

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Canadian Plant for S. C. Johnson

WINDSOR, ONT., May 6—The S. C. Johnson Co., Racine, Wis., will soon establish a Canadian factory here.

—

Pacific Overland Companies Consolidated

TOLEDO, OHIO, May 6—Two subsidiary companies of the Willys-Overland Co. on the Pacific coast have been consolidated. They are the Willys-Overland Co. of California, San Francisco, and the Overland Pacific, Inc., Portland. In future they will be styled Willys-Overland Pacific Co., and will be in charge of Frank Riggs, formerly in the Packard truck department at Detroit. The new company will furnish cars to California, Oregon, Washington and parts of Montana, Idaho, Nevada and Arizona.

—

Harley-Davidson Concentrates on 400-Lb. Commercial Model

MILWAUKEE, May 4—The Harley-Davidson Motor Co., which in the past has made several commercial models, including a 600-lb. side van and a 400-lb. three-tracker truck, has decided to concentrate in the future on a 400-lb. side van. The motorcycle part will be identical with the Harley-Davidson solo motorcycle except that the engine compression will be slightly lower.

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Minerva Offices Moved

CLEVELAND, May 4—The Minerva Engine Co. has moved its general offices to the Vickers Bldg., East Sixty-sixth Street and Euclid Avenue.

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Harroun Production at $1,000,000 Mark

WAYNE, MICH., May 7—The Harroun Motors Corp. has already manufactured $1,000,000 worth of automobiles, and the $2,000,000 mark will be reached by July 4. On acount of the diversion of a large part of the Harroun plant to production of war supplies, original plans for the manufacture of automobiles have necessarily been curtailed. About 500 cars are being made a month and this output will be increased during the summer.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

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Giant Tire Plant Destroyed

FINDLAY, OHIO, May 5—The Giant Tire & Rubber Co. plant was completely destroyed by fire yesterday. The origin of the fire is not known. The loss is estimated at $140,000.

—

Winther Trucks for Navy

WINTHROP HARBOR, ILL., May 6—The Winther Motor Truck Co. has built two 3-ton trucks to be used by the U. S. Navy to carry gunpowder on trips of 200 miles or more. The trucks were driven from the factory to Washington, covering the distance of 950 miles in 4 days. They are in command of Lieutenant Merrill and driven by two of the jackies of the Great Lakes Training Station.

—

Assembling Plant for Fordson Tractors

COLUMBUS, May 4—An assembling plant for Fordson tractors will be erected here by Henry Ford & Son. The location has not yet been announced, but it is believed that the building will be near the assembling plant of the Ford Motor Co. on Cleveland Avenue.

—

Elgin Making New Car

CHICAGO, May 6—The Elgin Motor Car Corp. is building a new 4-passenger model styled Military Scout. The body is of the straight-line type, with beveled edge and full size rear fenders. The price is $1,195, f.o.b. Chicago.

—

Subers Fabric Decreases Capital

CLEVELAND, May 6—The Subers Fabric & Rubber Co. has decreased its capital stock from $1,500,000 to $15,000.

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Dividends Declared

The Continental Guaranty Corp., New York, formerly styled Guaranty Securities Corp., has declared a regular quarterly dividend of 2 per cent, payable April 30, to holders of record April 27.

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At a regular meeting of the Board of Directors of the Studebaker Corp., Detroit, held this week, the regular quarterly dividend of 1¾ per cent on preferred stock and 1 per cent on common stock was declared. This will be payable June 1 to stockholders of record May 20, at the close of business.

Fordson Tractors Already Placed on General Market

DEARBORN, MICH., May 6—The placing of the Fordson tractor on the general market was started this week. The local agencies must keep a supply of parts and accessories for the tractor, and the service system is a duplicate of the Ford car service system. In order to educate prospective dealers and others who will handle the tractor the agents are sending men to the Fordson plant, where they are being taught assembling from start to finish, so that they will be thoroughly familiar with the construction of the Fordson tractor.

—

Holt Working 3 Shifts

PEORIA, ILL., May 6—To increase the output of caterpillar tractors for the government, the Holt Mfg. Co. is using 3 shifts of 8 hours each at its plant here, to replace the 2 ten-hour shifts. Those employees who work the full 48 hours will be paid for 57 hours, the former working schedule. The plant is being enlarged and several new buildings are under construction.

—

Paige Adds Two New Units

DETROIT, May 7—The Paige-Detroit Motor Car Co. is preparing to add 2 units to its executive building. These will add 50 per cent to the present space and will provide for the requirements of the new Paige truck department officials.

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Addition for Long Mfg. Co.

DETROIT, May 7—The Long Mfg. Co. will start work on an addition to its plant this week. The new building will be 66 x 125, and will be ready in about 2 months.

—

Hal Reorganization Denied

CLEVELAND, May 6—The rumor that there will be a reorganization of the Hal Motor Car Co. has been denied by O. O. Vrooman, who was trustee in bankruptcy for the company. He said that the assets had been sold by him to a Chicago auctioneer and have now been sold on their own account. The Hal Motor Car Co. will be continued to repair and provide parts for Hal cars previously sold, but according to Mr. Vrooman there will be no further production of new cars.

—

Aborn Steel Opens Buffalo Office

NEW YORK, May 4—The Aborn Steel Co., Inc., has opened an office in the Marine Bank Bldg., Buffalo, N. Y. The Buffalo section will be in charge of D. J. Mahoney, district manager for the Aborn company and the Century Steel Works.

—

Gaston, Williams & Wigmore, Inc., Moves

NEW YORK, May 4—Gaston, Williams & Wigmore, Inc., exporter, has moved to its new building at 39 Broadway.

Industrial Review of the Week

A Summary of Major Developments in Other Fields

French Iron Ore Mines Coveted by German People

At the third meeting of the Verein Deutscher Eisen Und Stahl Industrieller which has been held since the war, in Berlin in early December, Dr. August Müller, under secretary of state, offered a report on the production of iron and steel. The report states that the iron and steel industries demand the retention of the iron ore basins of Briey and Longwy in France which are necessary to supplement the mines of Germany, the life of which is estimated at from four to five decades at the most. The Allies know that if the basis of the iron ore supply is not extended, after a lapse of 50 years, the Germans can no longer carry on war with native iron.

Professor Krusch, councillor of mines, presented a paper at the same meeting on the question of how far the German iron-ore mines will be able to supply the demand after the war. The author stated that out of the 19,800,000 tons of pig iron made in the year preceding the war, the blast furnaces were dependent upon foreign ores to the extent of about 50 per cent, while the whole of the 700,000 tons of manganese ores had to be imported. He referred to geological investigations which he had carried out in relation to the remaining inland deposits of iron ore. Taking the output of the mines, and assuming a natural development of mining without artificial restrictions in the production, the following results are obtained:

The deposits in Lorraine, which yielded 21,100,000 tons in 1913, would only last for about 45 years.

Those in the Siegerland spathic ore district (2,700,000 tons in 1913) would last 42 years.

Those in the Lahn-Dill region (1,100,000 tons in 1913) would continue for 66 years for red ore and 32 years for brown ore.

These three principal districts furnished about 25,000,000 tons out of the total production of 27,000,000 tons, the possible output of the other localities supplying the balance of 2,000,000 tons being limited, also for the future. Under these circumstances German iron ore mining will be exhausted in about 50 years, and the country will then be entirely dependent upon foreign supplies.

Certain native ore deposits cannot be regarded as reserves in the case of a future war. The country is therefore dependent upon foreign deposits in order to guarantee its supplies, and the most important country in this connection is France, which possesses 2,600,000,000 tons in the district of French Lorraine alone. In Normandy, Anjou and the Bretagne the ore deposits, mostly proved by Germans shortly before the war, amounted to 5,000,000,000 tons, and with the smaller deposits in the Pyrennees, Perigord, Algiers and Tunis, the aggregate reserves of France totaled 8,200,000,000 tons. On the other hand, the German deposits only total 2,300,000,000 tons of an average iron content of 30 to 35 per cent. The French deposits range from 45 to 50 per cent. As France only consumed 8,300,000 tons in 1913 out of a total production of 21,500,000 tons, that country was more favorably situated than Germany, and was able to surrender without damaging her own industry the quantity which Germany lacked.

The paper also mentioned the necessity for supplies from the Russian district of Krivoi-Rog, and from Poland, Sweden and Norway, and asserted that a share should also be secured in the extensive and valuable ore deposits in Brazil. In conclusion, the author urged that in the peace negotiations account should be taken of the imperative needs of the German iron and steel industry in the matter of securing the supply of iron ores, including manganese, as upon these requirements depend the existence of the industry and the nation.

The opinions of the author were unanimously accepted by the meeting, and a memorial was prepared showing why the possession of Briey and Longwy should be permanently retained, and the imports of Russian iron ore and manganese should be guaranteed.—*The Iron Trade Review.*

Optimistic Figures Cannot Avert Coming Coal Shortage

There is as yet no good reason to change the view that this country will be faced with a fuel shortage next winter. Only a very rapid and a very material betterment in car service can prevent what now seems inevitable. The Fuel Administration is disturbed because its eyes are focused on next winter; the Railroad Administration appears serene and seems to be happy in the fact that there is no crisis to-day. Statistics have been compiled to show that record tonnages of anthracite are being produced, but the consumer is anxious to know what has become of the coal.

Business in the steam sizes of anthracite is quiet, though here and there a little contract activity in these grades is reported. When the railroads begin to buy soft coal, and when the difficulty of procuring bituminous coal becomes more evident, it is believed there will again be keen interest in the steam sizes.

In an effort to protect the supply of anthracite to the Middle Atlantic and New England States, the zoning plan was further tightened this week by an order from the Fuel Administration barring the shipments of hard coal to the South without special permit.—*Coal Age.*

Steel Industry in Stride with War Work

The steel trade is coming quickly into the new stride on war work. Even those of its leaders who were in the best position to gage the Government's demands in the remainder of the year were surprised at the size of the job cut out for them by the War Industries Board. There was almost equal surprise at Washington at the final showing after four months' efforts to get estimates from Allies, the Army, the Navy, Railroad Administration and all essential industries.

On May 1, with 354 furnaces in blast, an increase of 10 in the month, production was at the rate of 113,440 tons a day, which would mean 41,400,000 tons of coke iron in a year. In 1917 the production of coke iron was 38,270,000 tons. Such a gain over last year's rate is highly significant.

Though the figures are not yet compiled, it is known that the steel ingot production in April made a good increase over the record in March.

Buying of iron and steel for general use has stopped short. No consuming industry is reported closed, but some are plainly marked for restriction. The passenger automobile output will be cut down greatly. Pig iron shipments to stove and sanitary equipment foundries are likely to be curtailed.

There is still the belief that 60 days' concentration on war needs and the appeal this may make to workmen to increase output will relieve the situation in no small degree by July 1. An important steel company is passing the pledge for full co-operation with the Government down the line through its operating departments as well as its sales organization, to be individually signed.

On the other hand some items in the Government schedule are growing. The steel that must be sent to Great Britain and France on General Pershing's pledges is now put at 1,250,000 tons, an increase of 500,000 tons over the estimate of four weeks ago. In the past week General Pershing has cabled for 100,000 tons of rails, and of these 76,000 tons will be supplied from the 67½-lb. rails rolled for Russia and still stored in this country. A Pennsylvania mill will roll the remaining 24,000 tons in 80-lb. sections.

Of 2,200,000 tons of shell steel already allocated for 1918, shipments thus far amount to 1,500,000 tons. The year's orders on shell account are put at 5,000,000 tons.

This shell steel total is likely to leave as a by-product upward of 1,250,000 tons of relatively high-carbon material—the discard made arbitrarily as well as otherwise under the specifications. It is suggested that this should be utilized in some war products.—*Iron Age.*

More Contracts Awarded By Ordnance Department

WASHINGTON, May 4—The following contracts have been placed by the Ordnance Department recently:

April 19

Milwaukee Steel Foundry Co., Milwaukee: Cast steel wheels of Nash quad type for 2-ton truck chassis.

General Electric Co., Schenectady, N. Y.: Type H. T. 25-cycle 0.750 K.V.A. 5600/13,200 volts Y. 480 volts, 3-phase oil-cooled transformers.

Westinghouse Electric & Mfg. Co.: Packing boxes for rifle grenade dischargers.

Pyrene Mfg. Co., Washington: 1 qt. Pyrene type extinguishers, charged ready for use.

Carr Fastener Co., Cambridge, Mass.: Carr durable fasteners for breech-mechanism covers, and Carr "Lift the Dot" fasteners, pouches M. 1910.

Prest-O-Lite Co., Inc., Indianapolis: Tubular oil can, oil-can nozzles (spares) for 75 mm. carriage.

L. S. Starrett Co., Athol, Mass.: 50 feet steel tapes, Dodge chassis.

Greenfield Tap & Die Co., Greenfield, Mass.: Tap and die sets from ¼ to ¾ in.; tap and die sets from ¼ to ¾ in. for Dodge chassis, layout, 1917.

Champion Ignition Co., Flint, Mich.: Dodge Special Cico plugs.

Firestone Tire & Rubber Co., Akron, Ohio: 30 x 3½ nonskid casings; 30 x 3½ gray inner tubes for Ford machine-gun trucks.

Aluminum Co. of America, Pittsburgh, Pa.: 1½-in. manganese soft aluminum wire, for manufacturing meat cans.

Goodyear Tire & Rubber Co., Akron, Ohio: 30 x 3½ clincher casings; 30 x 3½ gray inner tubes for Ford machine gun trucks; packing tires.

B. F. Goodrich Rubber Co., Akron, Ohio; 30 x 3½ nonskid casings; 30 x 3½ gray inner tubes for Ford machine-gun trucks.

Russell Motor Car Co., Buffalo, N. Y.: Cold-drawn Bessemer screw stock for manufacturing Mark II fuse.

April 22

Asbestos & Rubber Works of America, New York: 6¾ x 3 asbestos strips for 3-in. stokes, trench mortar shells, Mark I; 10 x 1¾ asbestos strips for 3-in. stokes, trench mortar shells, Mark I.

Lunkenheimer Co., Cincinnati: Figure 900 ⅜-in., brass stem globe needle valves; Figure 906 ½-in. brass stem globe needle valves (for United States filling plant).

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.: Oil circuit breakers and lightning arresters.

C. H. Martin, care of Martin Rocking Fifth Wheel Co., Springfield, Mass.: 1-ton creeper-type trucks for experimental purposes.

General Electric Co., Schenectady, N. Y.: Switchboards and equipment.

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Receiver for Pull-More Truck

NEW CASTLE, PA., May 7—A receiver has been appointed for the Pull-More Motor Truck Co. W. S. Craig, assistant secretary, admitted the insolvency of the company, and joined in the request for a receiver.

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Dort Making New Model

FLINT, MICH., May 8—On May 15 the Dort Fleur de Lis roadster will make its appearance. This is a 3-passenger car of the cloverleaf type, with divided front seats, the driver's seat being slightly back of the passenger seats. The lines vary considerably from those of the preceding model. The sill curve in the rear is changed, the divan is wider, and there is more leg room. The standard model has a gray body, fenders and wheels with white stripes below the sill. The fenders and radiator are black and the top is of mohair. The car is mounted on a Model 11 chassis, with a new engine 3½ x 5.

The car will sell for $865 and $60 extra for wire wheels.

More Contracts for Parts of "B" Standardized Trucks

WASHINGTON, May 6—The following contracts have been awarded for Class B standardized trucks:

April 17, 1918.

Standard Parts Co., Cleveland; plain washers.

Gramm-Bernstein Motor Truck Co., Lima, Ohio; body mounting sills.

Columbus McKinnon Chain Co., Columbus, Ohio; skid chains.

April 20, 1918.

Gramm-Bernstein Motor Truck Co., Lima, Ohio; skid chain anchor hook.

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Addition for Monarch Tractor

WATERTOWN, WIS., May 7—The Monarch Tractor Co. has awarded contracts for the erection of a brick and steel addition to its machine and assembling shop. When this work is completed the foundry will be extended also. Business men of Watertown have provided acreage for a new warehouse and shipping building, which may be erected during the coming summer.

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Quartermaster Contract Awards

WASHINGTON, May 8—Contracts have been awarded by the Quartermaster Department, recently, as follows:

Bowen Products Corp., Cleveland, Ohio: Pieces and plate grease cup.

American Chain Co., Bridgeport, Conn.: Pieces sprag stay chains.

Detroit Lubricator Co., Detroit: Clutch release bearing oiler assemblies.

E. D. Clapp Mfg. Co., Auburn, N. Y.: Sprag stay chain anchors and sprag stay chain shackles.

Splitdorf Elec. Co., Newark, N. J.: Magnetos.

The foregoing contracts were placed for parts and materials for the standardized war trucks class B type.

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co	54	58	—2
*J. I. Case T. M. Co. pfd	84	86	..
Chalmers Motor Co. com	5½	8	..
Chalmers Motor Co. pfd	30	40	..
*Chandler Motor Co	79	80	—2
Chevrolet Motor Co	119	123	+1
*Fisher Body Corp. com	33	35	..
*Fisher Body Corp. pfd	82	87	..
Fisk Rubber Co. com	50	53	+1
Fisk Rubber Co. 1st pfd	98	103	..
Fisk Rubber Co. 2nd pfd	70	75	..
Firestone Tire & Rubber Co. com	93	96	—3
Firestone Tire & Rubber Co. pfd	94	96	..
*General Motors Co. com	115	117	—1
*General Motors Co., pfd	78¾	79½	..
*B. F. Goodrich Co. com	43	44½	—1½
*B. F. Goodrich Co. pfd	95	100	..
Goodyear Tire & Rubber Co. com	144	149	—3
Goodyear Tire & Rubber Co. pfd	96	98	..
Grant Motor Car Corp	3¼	4¼	— ¼
Hupp Motor Car Corp. com	2¾	3½	..
Hupp Motor Car Corp. pfd	79	85	..
International Motor Co. com	22	25	..
International Motor Co. 1st pfd	50	58	—2
International Motor Co. 2nd pfd	23	28	..
*Kelly-Springfield Tire Co. com	41	43	..
*Kelly-Springfield Tire Co. 1st pfd	79	85	..
*Lee Rubber & Tire Corp	14	15	+1
*Maxwell Motor Co., Inc., com	25¾	26	..
*Maxwell Motor Co., Inc., 1st pfd	52	54	..
*Maxwell Motor Co., Inc., 2nd pfd	18	21	—2
Miller Rubber Co. com	103	105	—3
Miller Rubber Co. pfd	95	97	..
Packard Motor Car Co. com	95	105	+9
Packard Motor Car Co. pfd	89	92	..
Paige-Detroit Motor Car Co	17	18	— ½
Peerless Truck & Motor Corp	12	14	—1
Portage Rubber Co. com	107	109	+5
Reo Motor Car Co	14	16	..
*Saxon Motor Car Corp	7	9	+1
Standard Motor Construction Co	12	14	..
*Stewart-Warner Speed. Corp	56	58	+2
*Studebaker Corp. com	36	37	..
*Studebaker Corp. pfd	75	100	+10
Swinehart Tire & Rubber Co	26	30	..
United Motors Corp	24	24½	— ¾
*U. S. Rubber Co. com	56	57	—1
*U. S. Rubber Co. pfd	102½	104½	+1½
*White Motor Co	41	42	— ½
*Willys-Overland Co. com	17½	18	+1
*Willys-Overland Co. pfd	79	82	—1

*At close. Listed N. Y. Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co	..	7¾	..
Bower Roller Bearing Co	17½	..	+ ¼
Chevrolet Motor Co	120	122	..
Commerce Motor Car Co	..	10	..
Continental Motor Co., com	5⅜	5½	..
Continental Motor Co, pfd	..	..	..
Edmunds & Jones com	..	..	..
Ford Motor Co. of Canada	175	180	—23
Hal Lamp Co	..	..	..
Michigan Stamping Co., com	13½	14⅛	+ ¼
Motor Products	..	..	..
Packard Motor Car Co., com	95	..	— ½
Packard Motor Car Co., pfd	..	..	..
Paige-Detroit Motor Car Co	17¼	18	+ ⅛
Prudden Wheel Co	..	12½	..
Reo Motor Car Co	14¾	15¼	..

INACTIVE STOCKS

Atlas Drop Forge	..	26	..
Kelsey Wheel Co	90	92	..

Chicago Manufacturers Over the Top with Bonds

CHICAGO, May 6—Although this city as a whole was ahead of its quota in its Liberty Loan sales, the automotive industry made a still better showing. Practically all dealers here have reported sales, and 240 companies have subscription percentages of 100 per cent or better. A subscription percentage of more than 100 per cent means that not only has each employee bought bonds, but that sales have been made to outsiders as well.

The Zinke Co. heads the list with 300 per cent. Twenty-two manufacturers have showings of 100 per cent or better. A partial list of these follows:

Vesta Accumulator Co.
Elgin Motor Car Corp.
Van Sicklen Co.
Twin Tube & Rubber Co.
G. P. Coal Oil System.
Fowler Lamp & Mfg. Co.
Commercial Truckmobile Co.
International Harvester Co.
Vancleef Brothers.
Kero Carburetor.
Hill Pump Valve Co.
Stewart-Warner Speedometer Corp.
Johnson Automobile Lock Co.
Buell Mfg. Co.

Other organizations, including the Stromberg Motor Devices Co., Findeisen & Kropf, Diamond Motor Car Co., Parrett Tractor Co. and the Parry Auto Lock are well up in percentages.

The Stewart-Warner company has subscribed $201,400 and the International Harvester Co. $4,000,000.

The Parrett Tractor Co. has subscribed $14,750, and has a 95 per cent rating. Findeisen & Kropf have subscribed $21,850. The trucks used by the Goodyear company in the Akron to Boston trips will be used in the campaign tomorrow.

Altogether, 20,900 out of the 21,400 employees of the Chicago factories have bought bonds, leaving only 500 without them.

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Berger Employees Subscribe for Bonds

CANTON, OHIO, May 7—Ninety-eight and eight-tenths per cent of the employees of the Berger Mfg. Co. have bought Liberty bonds, their subscriptions totaling $112,750. A team of 75 workers, in 6 teams, organized the campaign. They have formed an auxiliary to the Council of National Defense, which will extend throughout the plant. Every employee of the company has been invited to join. This council will co-operate with the Government in all war and patriotic campaigns.

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Loan Subscriptions of Industries

DETROIT, May 7—The following is a partial list of large manufacturers who subscribed to the Third Liberty Loan:

Company	Subscription	Employees
Denby Motor Truck	$10,000	$10,000
Ford Motor Co	4,750,000	1,250,000
Packard Motor Car Co	600,000*	.....
Hupp Motor Car Co	40,000	50,000
Chalmers	450,000*	.....
Cadillac Motor Car Co	500,000	255,000
Fisher Body Corp	500,000	255,000
Willys-Overland Co	750,000	.....
Dodge Brothers	1,000,000*	.....

*This includes subscriptions of employees; the company underwrote the entire amount. The company will take all that is not subscribed by employees; based on the results of the previous loan, the amount the company will take will be about 50 per cent of the total.

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Pontiac Subscribes $1,500,000 to Liberty Loan

PONTIAC, MICH., May 6—At the close of the Third Liberty Loan the total subscriptions here reached a sum of $1,446,900, of which a large proportion was contributed by the automobile and allied industries. Some of the subscriptions are shown in the following list:

Wilson Foundry Co	$200,000
Oakland-Northway plants	179,350
General Motors	130,000
Hess-Pontiac Spring Co	31,000
Olympian Motors Co	24,000
Michigan Drop Forge Co	8,000
Monroe Body Co	8,250
Monroe Motors	5,300
American F. & S. Co	6,100
Precision Casting Co	2,950
Hubbard Spring Works	1,700
Pontiac Paint Co	850
Pontiac Foundry Co	400

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Dealers Line Up With Government

WASHINGTON, May 4—The Commercial Economy Board, of which A. W. Shaw is chairman, has endorsed the work of the War Service Committee of the National Automobile Dealers Assn. President F. W. A. Vesper to-day reported to Chairman Shaw the recommendations of the committee, whereupon the job of developing the recommendations was turned over entirely to the N. A. D. A.'s committee.

A meeting of the War Service Committee and the Board of Directors of the association will be called shortly for some date in May.

Philadelphia Factories Oversubscribe Their Quota

PHILADELPHIA, May 6—A partial list of subscriptions to the Third Liberty Loan from factories in this city, and branches of factories, follows:

Atwater Kent Mfg. Co	$46,700
Commercial Truck Co. of America	16,250
Firestone Tire & Rubber Co	30,000
B. F. Goodrich Co	40,050
Goodyear Tire & Rubber Co	3,000
Hess-Bright Mfg. Co	114,500
Kelly-Springfield Tire Co	42,000
Locomobile Co. of America	10,000
Roland Spring Co	10,000
Standard Roller Bearing Co	100,000
Studebaker Corp. of America	25,000
United States Tire Co	25,000
Vim Motor Truck Co	5,150

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Four Wheel Drive Oversubscribes Quota

CLINTONVILLE, WIS., May 7—Employees of the Four Wheel Drive Auto Co. subscribed for $46,500 worth of bonds of the Third Liberty Loan. This figure is exclusive of the amounts subscribed by officers of the company. The quota apportioned to the factory was $20,000.

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To Blaze Trail for Michigan Tour

DETROIT, May 8—A pathfinding tour over the East Michigan Pike will be made by Don F. Huestis of Harbor Beach, treasurer of the East Michigan Pike Assn., preparatory to the third annual trip of the association members. Mr. Huestis will make all arrangements on the pathfinding tour for accommodations for guests in the various communities and for the meetings which will be held in every town where road building has not been taken up.

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Chandler Production Decreases

CLEVELAND, May 6—The Chandler Motor Car Co. produced only 2000 passenger cars during the first 3 months of 1918, as compared with 4400 during the corresponding period last year.

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Half of Michigan Workers in Automotive Work

DETROIT, May 6—In Michigan the automobile industries employ almost 50 per cent of the industrial workers in six of its largest cities. For instance, Detroit employs 118,489 men in automotive work; Flint, 18,262; Lansing, 7875; Pontiac, 5747; Jackson, 4683, and Muskegon, 2847.

Calendar

RACING

May 16—Uniontown. Uniontown Speedway Assn.
May 30—Sheepshead Bay, N. Y. Championship races.
June 22 — Chicago. Chicago Speedway.
July 4—Cincinnati. Cincinnati Speedway.

ASSOCIATIONS

May 10—New York. Highway Traffic Assn. 8.30 P.M. Automobile Club of America Bldg.
May 13-18—Cleveland. War Convention of Machinery, Tool & Supply Industry of the United States.
June 3-4 — Chicago. National Gas Engine Assn. Eleventh Annual. Hotel Sherman.
June 5-12—Hot Springs, Va., National Assn. Automobile & Accessory Jobbers.
June 17-19—Dayton, O., Society Automotive Engineers, Annual Midsummer Session.

SHOWS

Sept. 23-28—Chicago, National Accessory Show for Fords. Coliseum.

ENGINEERING

June 26-28 — Buffalo, N. Y. American Society of Heating and Ventilating Engineers.
Sept. 2 — Cripple Creek, Colo. American Institute of Mining Engineers.
Nov. 14-15—New York. Society of Naval Architects and Marine Engineers. Twenty-sixth general meeting. Engineering Societies Bldg. 29 West 39th Street.